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Journal of ORAL SURGERY

AMERICAN DENTAL ASSOCIATION

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AND SCIENCE OF
ORAL SURGERY

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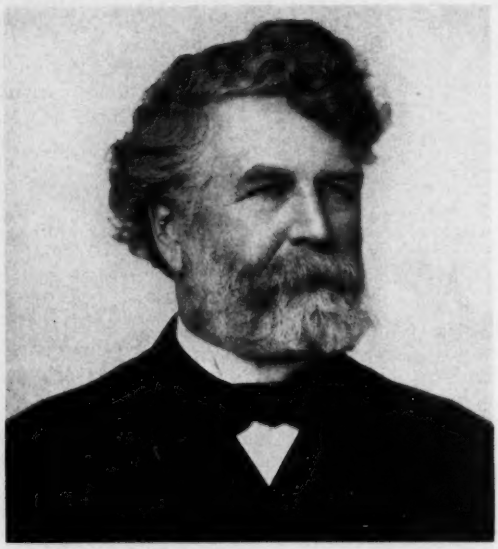

TRUMAN W. BROPHY

TRUMAN W. BROPHY, D.D.S., M.D., LL.D., Sc.D., F.A.C.S. (1848-1928), one of the pioneers in oral surgery and one of the most outstanding oral surgeons of modern times, was born in Will County, Illinois. He was one of the originators of the Chicago College of Dental Surgery, which institution he served for some forty years as professor of oral surgery and as dean. Previous to his specializing in oral surgery, Dr. Brophy enjoyed an international reputation as a skilful dentist, and when he confined his activities to oral surgery, he attained worldwide fame as an oral surgeon and particularly as the protagonist of the so-called Brophy operation for cleft palate.

A recent writer on the subject of cleft palate raised some question as to the origin of the Brophy operation, but whatever may be said of its origin, Dr. Brophy certainly popularized the operation and, through his efforts, made oral surgery as a specialty of dentistry known the world over. He was a constant contributor to dental and medical literature and was a leader in the development of dental education. For many years he was chairman of the Commission on Education of the International Dental Federation, and for twelve years was president of that body.

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VOLUME 7 • OCTOBER 1949 • NUMBER 4 JOURNAL OF ORAL SURGERY

Traumatic injuries to the temporomandibular joint

■ *Irving Salman, D.D.S., New York*

The mandible, the only movable bone of the face, is the one most frequently injured. Direct and indirect blows to the lower jaw may result in either unilateral or bilateral fractures of the condyles with or without fractures of the body of the mandible. It is extremely rare for the condyle itself to be fractured; the break usually occurs at the neck of the condyle. When this occurs there is generally a forward and medial displacement due to the pull of the external ptyergoid muscle, a two headed muscle, one of which is attached to the neck of the condyle while the other is inserted into the disk of the temporomandibular joint. The condyle may also be displaced posteriorly, medially or laterally, with overriding of the parts.

■ *Fractures of the Condyle*

Fractures of the condyles do well, and satisfactory function can be attained without accurate realignment of the fragments. Simplicity in treatment with effective means is paramount in the treatment of fractures of the condyles, as it is in the treatment of fractures of the body of the mandible. In almost all cases, a perfect functional result without deformity can be obtained by simple interdental methods of immobilization.

CASE 1—A boy, aged 13, received a blow on the chin. Clinical examination revealed slight edema and tenderness in front of the left ear. There was a definite lateral shift of occlusion to the left.

Roentgenograms revealed a fracture of the neck of the left condyle, with an anterior medial displacement of the condyle head (Fig. 1, left).

The jaws were immobilized with intermaxillary arch wires and rubber bands. No attempt was made to manipulate the condyle into normal position.

The postoperative course was uneventful, and the wires were removed three weeks later. Roentgenograms taken nine months after the injury showed a normal alignment of the left condyle. There was no deformity, and function was normal (Fig. 1, right).

Read before the Oral Surgery Section, Second District Dental Society, New York, April 22, 1948.

Assistant professor of oral surgery, New York University, College of Dentistry, New York.

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Fig. 1.—Left: Roentgenogram showing a fracture of the neck of the left condyle with an anterior medial displacement of the condyle head. Right: Postoperative roentgenogram taken nine months later showing a normal alignment of the left condyle

CASE 2—A dentist received an injury to the mandible while playing baseball, which resulted in a fracture of the neck of the left condyle with anterior displacement and overriding of the parts (Fig. 2, *A*).

He was advised by an orthopedic surgeon that an open reduction was necessary, with direct wiring of the fractured parts. This was not done.

Intermaxillary wiring was used for immobilization without any attempt to manipulate the condyle into position (Fig. 2, *B*). The wires were removed after an uneventful four week period.

Postoperative roentgenograms taken three years later showed normal alignment of the left condyle. There was no deformity, and good function was present (Fig. 2, *C*).

CASE 3—A man, aged 45, sustained a fracture of the neck of the right condyle, fracture of the ribs and possible skull fracture when he was thrown from a horse.

Examination revealed no loss of function and no deformity. Roentgenograms showed a posterior displacement of the right condyle (Fig. 3, *A*). The lower jaw was immobilized to the upper jaw by intermaxillary wiring of the remaining few anterior teeth. The wires were removed after a three week period.

Postoperative roentgenograms taken three months after the injury showed a united but displaced right condyle, with no deformity or interference with function (Fig. 3, *B*).

Roentgenograms taken 15 months after injury showed rounding off of the displaced condyle, and good alignment of the parts (Fig. 3, *C*).

■ *Dislocation of the Temporomandibular Joint*

When the condyle passes beyond the

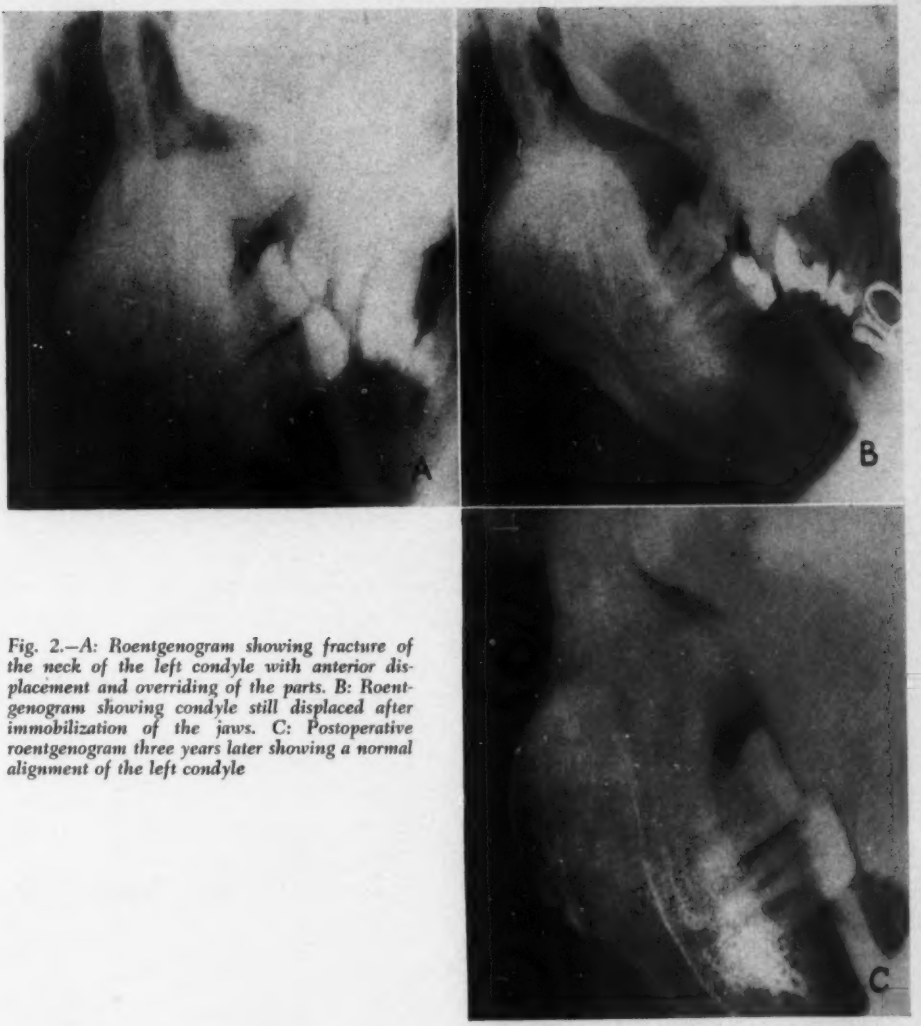

Fig. 2.—A: Roentgenogram showing fracture of the neck of the left condyle with anterior displacement and overriding of the parts. B: Roentgenogram showing condyle still displaced after immobilization of the jaws. C: Postoperative roentgenogram three years later showing a normal alignment of the left condyle

tubercle or the eminentia articularis and enters the zygomatic fossa it constitutes a dislocation or luxation of the temporomandibular joint. It occurs most frequently bilaterally, but may occur unilaterally. The most common cause is excessive forceful opening of the mouth. It may follow the act of yawning, coughing or laughing, or when the mouth is opened suddenly to its widest extent. Dislocations may occur after the use of mouth gags or props, as in tonsil or oral operations under general

anesthesia, overstretching of the joint while removing teeth, or during dental treatment.

Dislocations of the joints have followed the use of a bronchoscope, or a laryngoscope, and may sometimes be due to the anesthetist forcibly pushing the mandible forward during anesthesia, to obtain a clearer air passage. A shallow mandibular fossa with a low eminentia articularis, and loose, lax ligaments are predisposing factors in dislocation of this joint.

Following the reduction of an acute dislocation the joints should be rested by immobilizing the jaws with interdental fixation for a few weeks to permit the injured periarticular tissues to regain their normal tone.

■ *Subluxation*

The definition of subluxation is an incomplete dislocation. However, the self reducing dislocation should be included in this definition. Weakened periarticular tissues permit the condyles, seen roentgenographically in open mouth position, to slip into the zygomatic fossae. These are dislocations by definition. Yet, clinically, the jaws do not lock and can close without any need for manipulation.

Subluxation of the temporomandibular joints is not an infrequent occurrence. The same etiologic traumatic factors which may cause a dislocation may result only in subluxation. The factors of retention and limitation of the excursions of the condyles within the mandibular fossae are due to the function of muscles and ligaments.

Injuries to the periarticular tissues before they have returned to normal elasticity and tone may be a factor in hypermobility of the temporomandibular joints.

After the initial injury there may be

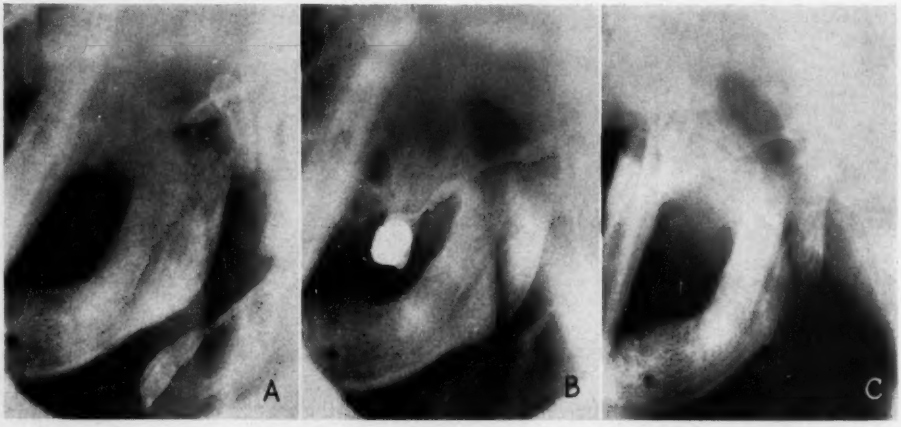

Fig. 3.—A: Roentgenogram showing a posterior displacement of the condyle. B: Postoperative roentgenogram three months later showing a united but displaced condyle. C: Postoperative roentgenogram fifteen months later showing rounding off of displaced condyle

edema and limitation of the degree of opening of the mouth, with pain over one or both joints. When edema is present over one joint, there is a bite of accommodation, with shifting of occlusion to the opposite side, and lack of occlusion on the affected side. In untreated cases, and even in some treated cases, the ligaments may not regain the normal tone, and chronic subluxation may result.

In this type of case it is advisable to immobilize the jaws with interdental arch wires and with the use of rubber bands. The occlusion can be returned to normal in 24 to 48 hours. The jaws should be left at rest for a week after the reduction of symptoms to permit healing.

REPORT OF CASE—A man, aged 40, reported for examination and treatment October 10, 1947. He gave a history of hearing a click and feeling a sudden pain in the region of the right temporomandibular joint while eating an apple four days previously.

He awoke the next morning with pain and some swelling about the right temporomandibular joint. A dentist diagnosed the condition as a dislocation and tried to reset it. The patient returned to the dentist the next day, and further manipulation of the dislocation was made.

Examination revealed swelling about the right temporomandibular joint. There was a definite shift of occlusion to the left side, and only the posterior teeth on the left side occluded (Fig. 4). Partial trismus and pain were present.

Roentgenographic examination of the temporomandibular joints in closed mouth position, right side, showed the head of the condyle in an inferior position in the mandibular fossa. In closed mouth position, left side, the head of the condyle was apparently in a normal position (Fig. 5, above). Open mouth position showed limited movements of right and left condylar heads (Fig. 5, below).

Fig. 4.—Photograph showing occlusion shifting to the left side

IMPRESSION—This condition seemed to be an injury to the right temporomandibular joint, with a bite of accommodation, due to an inflammatory process present in the right temporomandibular joint.

TREATMENT—Sectional arch wires were inserted on the right side, and rubber band elastic pull was used to overcome the patient's bite of accommodation. Within 24 hours the occlusion shifted to normal position (Fig. 6, *A*). The patient felt more comfortable.

Five days later the rubber bands were removed. The occlusion remained in normal position (Fig. 6, *B*). The arch wires were kept in position for another 48 hours, as a precautionary measure, and the patient was instructed to exercise his jaws.

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Figures 6, *C* and *D* are photographs showing closed mouth and open mouth positions after the removal of the arch wires.

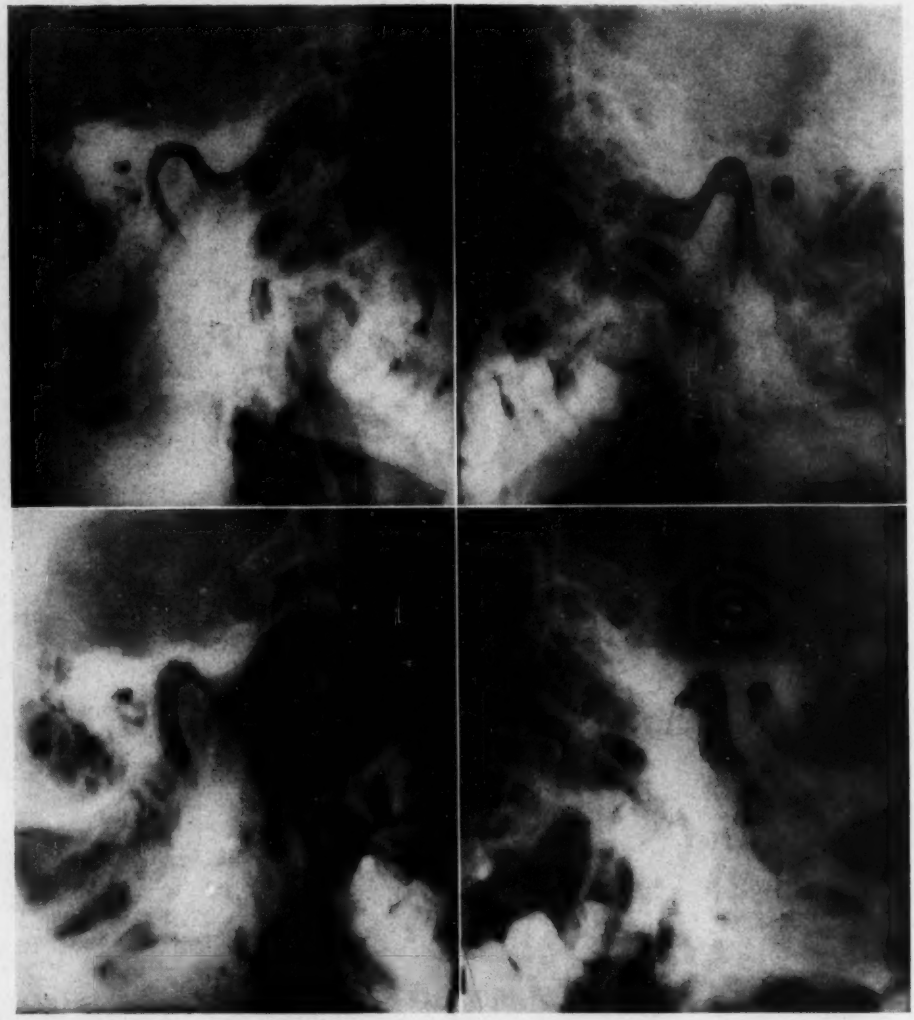


Fig. 5.—Above: Closed mouth position showing the head of the left condyle apparently in normal position in the mandibular fossa. Closed mouth position showing head of the right condyle in an infra position in the mandibular fossa. Below: Open mouth position showing limited movements of the right and left condylar heads

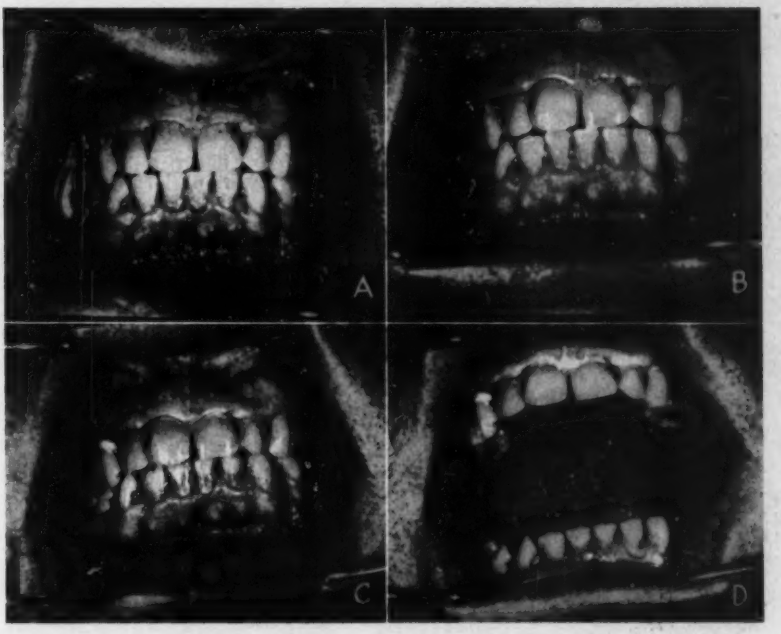


Fig. 6.—A: Photograph taken 24 hours after applying sectional arch wires and rubber bands in position, showing occlusion shifted back to a normal position. B: Photograph taken five days after rubber bands were removed with sectional arch wires still in position, showing the occlusion still in normal position. C and D: Photographs showing closed mouth and open mouth positions after removal of sectional arch wires

Postoperative roentgenograms of the temporomandibular joints, closed mouth position, showed the heads of the right and left condyles in apparently normal position in the mandibular fossae (Fig. 7, above). Open mouth position showed normal positioning of the heads of the condyles, just below the articular tubercle (Fig. 7, below).

■ *Ear Infections*

Infections in the ear may be accompanied by swelling about the temporomandibular joint. The edema and inflammation may produce symptoms simulating those which follow the initial injury to a temporomandibular joint.

REPORT OF CASE—A man, aged 38, reported a swelling in the region of the right temporomandibular joint, and complained of pain in and about his right ear. There was no history of any injury.

Clinical examination revealed a hard, nonfluctuating swelling in the region of the right ramus of the mandible and temporomandibular joint (Fig. 8, *A*). There was no tenderness on palpation. Partial

trismus was present. The teeth did not occlude normally. There was a distinct shift to the left, the width of a lower incisor.

Intraoral examination was negative.

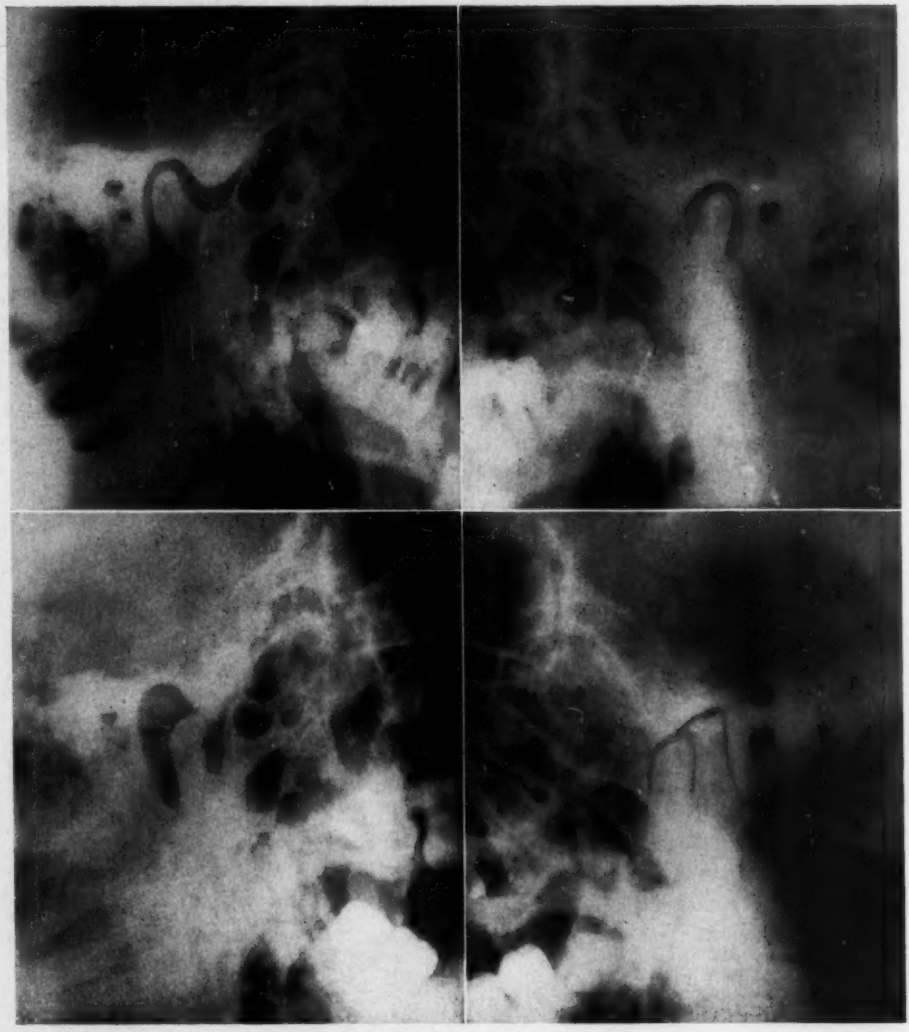


Fig. 7.—Above: Postoperative roentgenograms of the temporomandibular joint, closed mouth position, showing heads of right and left condyles in apparently normal position in the mandibular fossa. Below: Open mouth position, showing normal positioning of the heads of the condyles just below the articular tubercle

Roentgenographic examination of the teeth and jaws was negative.

Roentgenograms of the temporomandibular joints, closed mouth position, showed the head of the right condyle was in an inferior and anterior position; almost to a position the condyle head takes when the mouth is opened to a normal degree (Fig. 8, *C*). The head of the left condyle was in normal position in the mandibular fossa (Fig. 8, *D*).

TREATMENT—The patient was referred for an ear examination. The report was positive for an external ear infection. Five days later there was spontaneous drainage from the right ear, and the symptoms gradually subsided (Fig. 8, *B*).

■ *Temporomandibular Joint Disturbances*

Frequently subluxation and especially temporomandibular joint disturbances are due to abnormalities of occlusion and occlusal disharmonies. Premature occlusal contact associated with an unbalanced bite, malocclusion or replacement of an inlay or bridge which may have a premature contact, often result in traumatization of the meniscus.[1]

SYMPTOMS—The most frequent symptoms in subluxation is the characteristic snapping, clicking, grating sound heard when the mouth is opened or closed and in lateral excursions of the mandible. The noise varies in intensity from a mild grating sound to an audible cracking that can be heard for some distance. In some instances, individuals have found this noise so embarrassing to them that they hesitate to eat in public places. This noise is probably due to the slipping or displacement of the fibrocartilaginous disk which often does not have the same range of movement as the head of the condyle. Pain may or may not be present. The pain may be constant or intermittent, either localized to one or both joints or reflexed to the ear, back of the ear and temporal regions and even the cheek, simulating pain due to teeth, and may be mistaken for pain due to teeth.

There may be a locking of the jaws, and it is often necessary for the patient to manipulate the mandible before the mouth can be opened to the fullest extent. This locking is thought to be caused by the articular disk folding and getting caught between the head of the condyle and posterior slope of the articular tubercle.

The degree of opening in open mouth position, when measured between the incisal edges of the teeth, will be excessive. In one case the degree of opening measured 73 mm. from incisal edges of upper and lower central teeth.[2]

TREATMENT — Surgical treatments, such as the partial or complete removal of the meniscus, or attempts to restore the tubercle by inserting a bony spur to limit the forward movement of the head of the condyle, have not been successful. Removal of the disk is not devoid of danger. The possibility of infection, facial nerve involvement with resulting paralysis, failure to dissect the fibrocartilage and the

1. Riesner, S., Roentgen Technic for the Mandibular Joint. *Internat. J. Orthodontia* 23:740 (July) 1937.
2. Salman, Irving, Sclerosing Agent in Treatment of Subluxation of Mandible and of Hemangiomas of Mouth. *U. S. Nav. M. Bull.* 44:361 (Feb.) 1945.

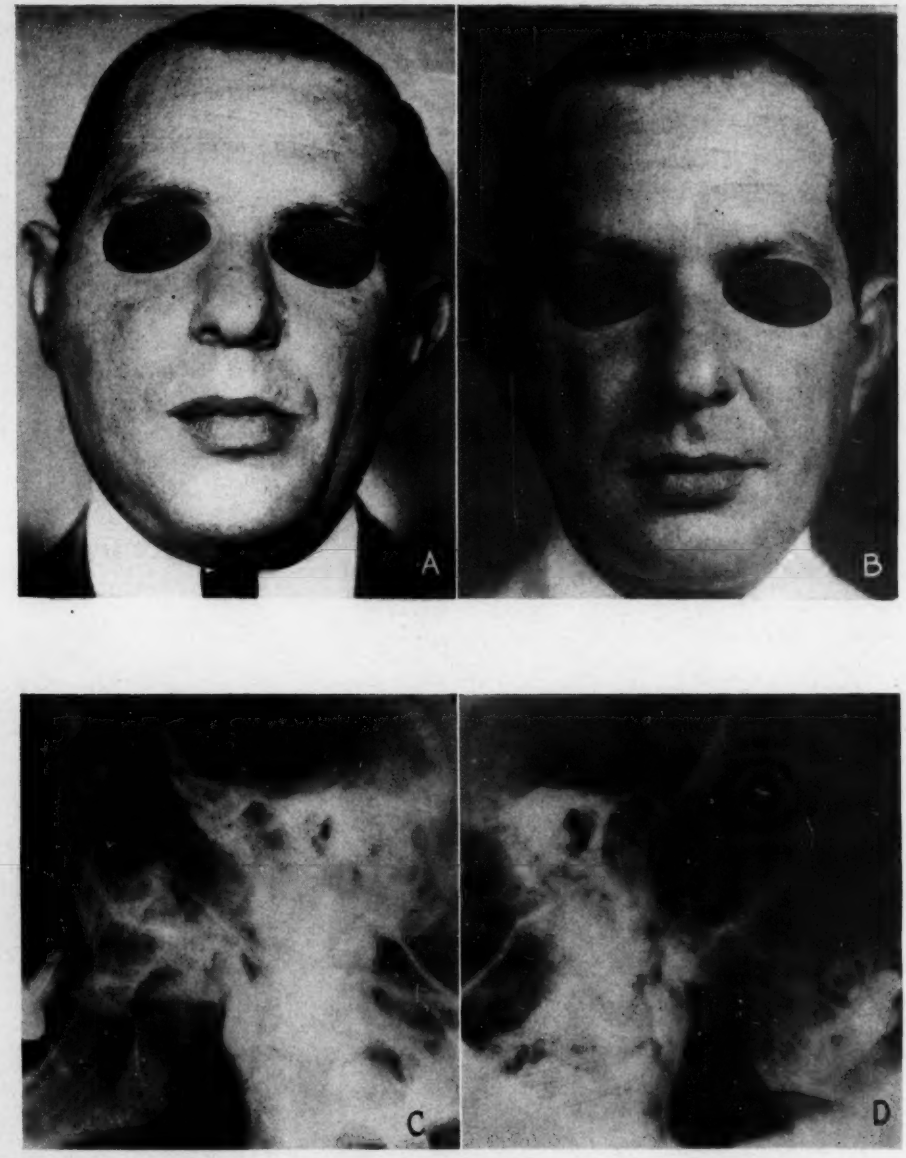


Fig. 8.—A: Photograph showing swelling of the right ramus of the mandible. B: Photograph of patient after swelling subsided. C: Roentgenogram, closed mouth position, showing head of the right condyle in a marked inferior and anterior position. D: Head of the left condyle in normal position in the mandibular fossa

resultant scars are some of the disadvantages of surgical treatment. Rebuilding the tubercle has not proved successful. In time this artificial spur is absorbed.

Immobilization in one form or another as a treatment for subluxation is an old method, and is still practiced by some, with uncertain results.

The injecting of a sclerosing agent into the temporomandibular joint for the treatment of subluxation was first described by Schultz[3] in September, 1937. Since then I have used this treatment. In properly selected cases, the results have been most gratifying. This treatment is definitely indicated in subluxation and chronic dislocations of the temporomandibular joint with or without pain being present, where there is locking of the jaws either in the open or closed position and when there is the grating, snapping and clicking sound present. The treatment is contraindicated in arthritis of the joint, other than traumatic arthritis, and where there is limited motion with its accompanying symptom of reflex pains due to occlusal dysfunction and disharmonies. The treatment here is proper restoration with equilibration of occlusion.

Schultz,[4] in his animal experiments, reported that a 5 per cent solution of sodium psylliate produced a firmer gross specimen than sodium morrhuate. The experiments showed no alteration of the joint cavity and no change in the ligaments other than their thickening, which strengthened the ligaments holding the joint within its cavity. There were no symptoms from injecting large doses directly into the blood stream or into the heart, and no infections resulted.

Moose,[5] in his experiments of injecting the temporomandibular joints of monkeys with a sclerosing solution, stated that the chief change was thickening and vascularity of the periarticular fibrous tissue with no evidence of chemical irritation within the joint cavity.

Histologic observations following the use of sodium psylliate for the nonsurgical treatment of hernias, as reported by Biederman,[6] showed that this solution causes a proliferation of fibrous tissue when injected into connective tissue. Six to fifteen hours after injection a polymorphonuclear leukocytic response with occasional round cells and some edema was noted. Twenty-four hours later the cellular infiltration showed a predominance of undifferentiated cells and some cell necrosis. The fifth day there was definite evidence of fibroblasts. About the eighth day there were more fibroblasts, many new blood vessels and occasional polyblasts. On the fourteenth day fibrous tissue was noted; on the eighteenth day mature fibrous tissue was observed; on the forty-second day dense scar tissue appeared.

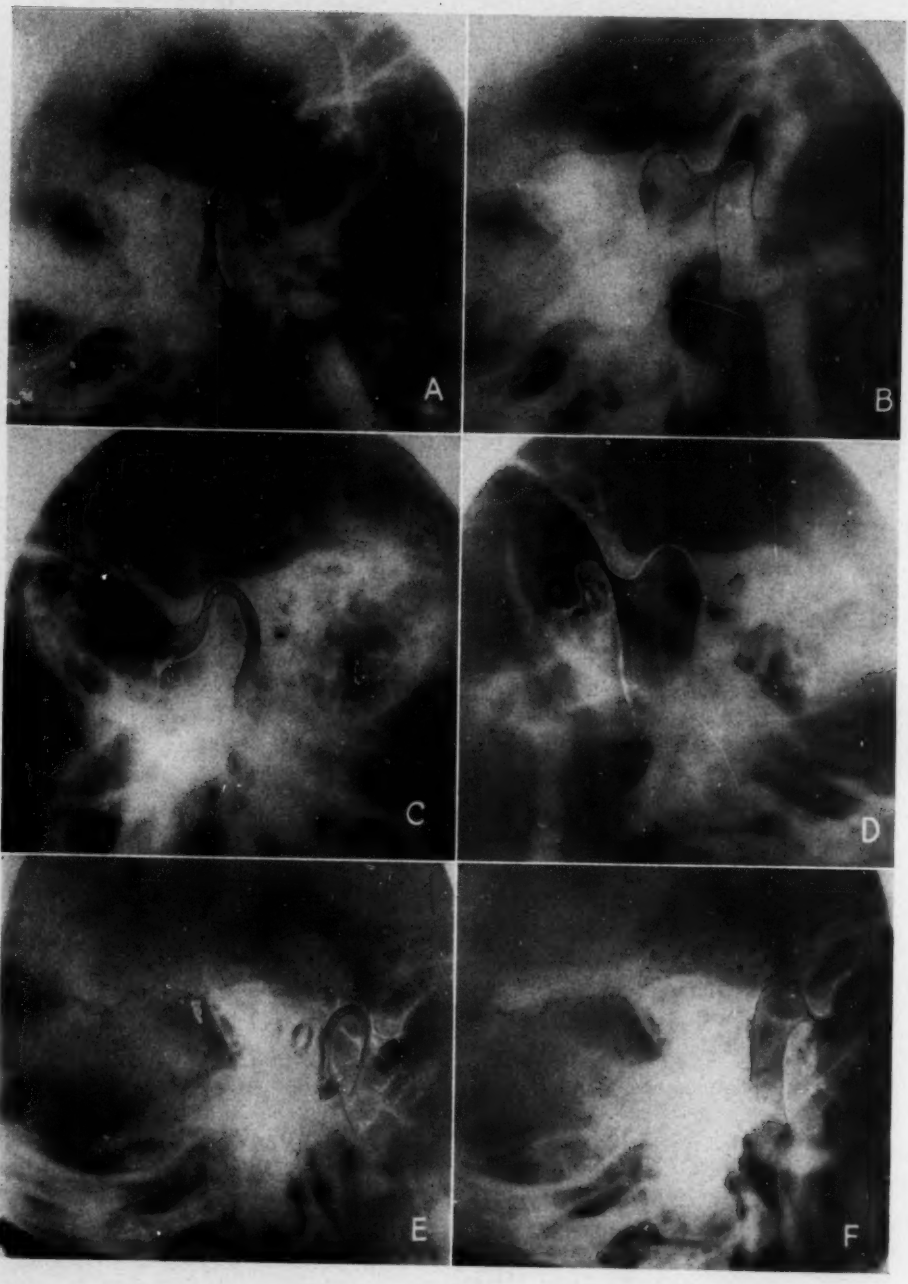
TECHNIC—I have used a fresh mixture of equal parts of 5 per cent sodium psylliate and 1 per cent eucupin solution in oil to help minimize the postoperative pain—the eucupin having a prolonged anesthetic action. The eucupin mixture has been discarded to avoid the possibility of

3. Schultz, L. W., A Treatment for Subluxation of the Temporomandibular Joint. *J.A.M.A.* 109:1032 (Sept.) 1937.

4. Schultz, L. W., Report of Ten Years' Experience in Treating Hypermobility of the Temporomandibular Joints. *J.O.S.* 5:202 (July) 1947.

5. Moose, S. M., Experimental Injections of Fibrosing Solutions into Temporomandibular Joints of Monkeys. *J.A.D.A.* 28:761 (May) 1941.

6. Biederman, Martin, The Injection Treatment of Hernia. *Med. Record* 145:239 (March) 1937.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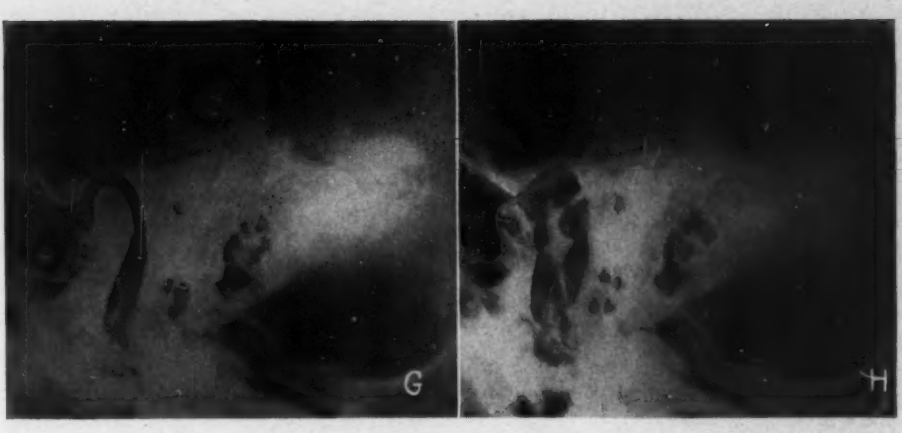

Fig. 9.—Opposite page. A: Roentgenogram, closed mouth position, showing head of the right condyle in normal position in the mandibular fossa. B: Open mouth position, showing right condyle out of the mandibular fossa and in the zygomatic fossa. C: Closed mouth position, showing head of the left condyle in normal position in the mandibular fossa. D: Open mouth position, showing left condyle out of the mandibular fossa and in the zygomatic fossa. E: Postoperative roentgenogram, closed mouth position, showing head of the right condyle in normal position in the mandibular fossa. F: Open mouth position, showing right condyle in a normal range directly below the tubercle. Above. G: Postoperative roentgenogram, closed mouth position, showing head of the left condyle in normal position in the mandibular fossa. H: Open mouth position, showing left condyle in a normal range directly below the tubercle

injecting an oily base solution into the blood stream. The postoperative reaction is no more severe with procaine hydrochloride than when the mixture with eucupin is used. Two 1 cc. tuberculin syringes are used, one containing procaine hydrochloride, the other sodium psylliate.

With the ball of the index finger placed in front of the tragus of the ear, the head of the condyle can be felt in its forward movement as the mouth is opened. After sterilizing the field of operation, a 26 gage needle, 1½ inches long, on a 1 cc. tuberculin syringe, is inserted directly posterior to the head of the condyle (open mouth position), in a slightly upward and inward direction, until contact is made with the medial wall of the mandibular fossa. The penetration of the needle will be from 2 to 3 cm. After contacting the medial wall of the fossa, the needle is withdrawn a few millimeters. Make the aspiration test by withdrawing the plunger. If no blood enters the syringe the needle tip is not in a blood vessel, and the solution may be deposited. If blood enters the syringe, change the direction of the needle until no blood can be aspirated. About 0.25 cc. of 2 per cent procaine hydrochloride is used. Detach the tuberculin syringe, leaving the needle in position, and attach the tuberculin syringe holding the sodium psylliate. Repeat the aspiration test and, again, when certain that no blood has entered the syringe, deposit 0.25 cc. to 0.5 cc. sodium psylliate

into the joint cavity. The injection is then repeated in the other joint cavity, even if the symptoms are present in only one joint. This is done to stabilize both joint cavities.

REACTION—The postoperative reaction may be pain, some edema over the temporomandibular joints, and partial trismus to a varied degree. The occlusion may shift to a protrusive one, the patient not being able to close in centric. The movements may be limited in lateral excursion. These postoperative symptoms will persist approximately four or five days. The patient is instructed to use his jaws normally, and cautioned against forcing the jaws open wide—as in yawning. Favorable results have been obtained with single injections or the injections can be repeated every ten days or two weeks—depending on the symptoms—until there is a sufficient fibrosis. Four or five injections may be the maximum number required to obtain the desired result. The occlusion should be checked and corrected in conjunction with this treatment, and missing teeth should be replaced.

REPORT OF CASE—A seaman, aged 28, gave a history of having been thrown overboard when his ship was blown up in 1944. He was picked up and treated at a United States naval hospital for fracture of the right leg. He also complained of pain in his jaw, but no treatment was instituted.

His facial pains disappeared within a few weeks, and he noticed, about a month later, that his lower jaw locked when he opened his mouth wide. To close his mouth, he manipulated his lower jaw from side to side. At times he asked aid from the medical or dental officer.

The patient was tranferred to several naval hospitals for treatment. At one hospital his jaws were immobilized for a few weeks with no result. At another hospital he was told there was no treatment for his chronic dislocation, and was offered a release from service. He refused a release and requested transfer to sea duty.

He was assigned to a training crew but was taken out of his crew shortly after because of this deformity, and placed on shore duty. During routine treatment at the Norfolk Dental Clinic in November, 1944, he was referred to the Oral Surgery Clinic for treatment.

Clinical Examination—The patient presented with a chronic dislocation of the temporomandibular joints. His mandible locked in open position every time he opened his mouth wide. The patient was able to reduce this dislocation by placing his thumb on the molar region and using downward pressure on the mandible. He then repeated the procedure on the other side. The degree of opening from incisal edge of upper central to incisal edge of lower central measured 55 mm.

Roentgen Examination—Roentgenograms of the right temporomandibular joint, closed mouth position, showed the head of the condyle in normal position in the mandibular fossa (Fig. 9, *A*); open mouth position showed the right condyle completely out of the mandibular fossa and in the zygomatic fossa (Fig. 9, *B*).

Roentgenograms of the left temporomandibular joint, closed mouth position, showed the head of the condyle in normal position in the mandibular fossa (Fig. 9, *C*); open mouth position revealed the left

condyle completely out of the mandibular fossa and in the zygomatic fossa (Fig. 9, *D*).

Treatment—Right and left temporomandibular joints were injected with 0.5 cc. of 5 per cent sodium psylliate and eucupin in oil, equal parts.

Postoperative Reaction—Forty-eight hours after treatment the patient experienced partial trismus, limited lateral movements of the mandible, slight pain about the temporomandibular region—which was controlled with sedatives—and slight protrusive occlusion. The degree of opening from incisal edge of upper central to incisal edge of lower central measured 25 mm. These symptoms disappeared within a ten day period, when the degree of opening measured 45 mm. anteriorly.

Although the jaws no longer dislocated in open position, it was thought advisable to inject the sclerosing agent a second time. One-half cubic centimeter of sodium psylliate and eucupin in oil was injected into each cavity.

The postoperative reactions were less severe after the second injection. The degree of opening measured 35 mm. after 48 hours. All symptoms disappeared after one week, and the degree of opening again measured 45 mm. The patient could move his jaws normally without dislocation of the mandible.

Postoperative Roentgen Examination—Roentgenograms of the temporomandibular joints, closed position, revealed the heads of the condyles in normal position in the mandibular fossae; open mouth position showed the condyles in normal range directly below the tubercles. See figure 9, *E*, *F*, *G* and *H*.

Periodic checkups were made, and in April 1945, when last seen, the patient had no recurrence of dislocation of the mandible. The degree of opening remained at 45 mm., and the patient was transferred to sea duty.

■ *Comments*

The treatment of injecting a sclerosing agent in the periarticular tissues of the temporomandibular joint is harmless and simple. I have used this treatment successfully for ten years, and while I was in service introduced the treatment in the Navy. It was especially indicated in our armed forces, because there was no loss of time from duty for the patient; an extremely important point during the war.

Proper roentgenographic study should be made before and after treatment of the temporomandibular joint. Roentgenograms of both joints should be taken—in the closed mouth, open mouth and bregma menton positions. The usual lateral projections are not always readily and accurately interpreted, unless laminagraphs are taken. Stereoscopic roentgenograms are more accurate for proper study and diagnosis of the temporomandibular joint. A combination of stereoscopic and laminagraphic study may be the answer, in the future, for proper registration and study of these joints. Lateral projections will, however, show the amount of forward movement of the condyle heads in open mouth position.—*New York University, College of Dentistry, New York.*

UMI

Complications in the administration of thiopental sodium

■ *Ellsworth A. Bruce, D.M.D., LL.B., El Centro, Calif.*

During the last five years, the use of thiopental sodium ("Pentothal") anesthesia has greatly increased. The frequency of the reports indicates that thiopental sodium is now being administered in many dental offices almost to the exclusion of other general anesthetics.

There can no longer be doubt that it fulfils many of the requirements for an ideal anesthetic: it is easily administered; it requires no complicated apparatus; it is pleasant for the patient; it does not require extensive premedication; it does not cause postoperative nausea; it is reasonably safe. Yet in its apparent simplicity lies the greatest danger, for this may lull the inexperienced anesthetist into a feeling of false security. Anyone capable of making a venipuncture can administer the drug, but training and experience are no less important than in the administration of any other general anesthetic. Because a dentist is skilled in the hypodermic injection of procaine hydrochloride, is no indication that he can immediately become proficient in the administration of intravenous anesthesia.

The general requirements have been stressed often enough to eliminate the necessity for a lengthy discussion in this paper. The reader is referred to the excellent article by Etsten and Himwich[1] on the physiologic basis for the stages of thiopental sodium anesthesia. Of prime importance is the necessity for trained assisting personnel. No dentist can be dexterous enough to be both operator and anesthetist. Protection of the patient under intravenous anesthesia is a full time job. But whether a nurse, dentist, or physician-anesthetist is used, the fact remains that it is the oral surgeon who is primarily responsible for the patient's welfare. It is incumbent upon him to acquire a sound understanding of the physiologic actions of thiopental sodium and be capable of meeting any emergency that may arise. This is both a moral and a legal obligation.

Those dentists and oral surgeons who pioneered in perfecting a safe technic particularly adapted for dental office administration deserve great credit.[2, 3, 4] Many physicians who formerly insisted that thiopental sodium should be used only in hospitals now admit that the dental surgeons have achieved an enviable record in the number of successful cases reported. Thiopental sodium now seems

1. Etsten, B., and Himwich, H. E., Stages and Signs of Pentothal Anesthesia: Physiologic Basis. *Anesthesiology* 7:536 (Sept.) 1946.

2. Bullard, O. K., and Brockett, S. I., Combined Pentothal Sodium Nitrous Oxide-Oxygen Anesthesia in Oral Surgery. *J. O. S.* 3:138 (Apr.) 1945.

3. Hubbell, A. O., Pentothal Sodium Anesthesia for Dental Surgery in Office Practice and Control of Recovery Time. *Anesthesiology* 4:174 (March) 1943.

4. Olson, B. A., The Administration of Pentothal Sodium in Specialized Office Practice in Oral Surgery. *J.O.S.* 1:197 (July) 1943.

to be "here to stay." It may be well, therefore, to review the more common complications that may arise with its use. This is intended neither to frighten the beginner in this field, nor to infer that other untoward reactions may not occur, but to emphasize some of the important emergency treatments recently reported in the literature.

■ *Injection into an Artery*

Of first importance in venipuncture is the differentiation of a vein and an artery. Mushin[5] has recently warned against inadvertent injection into an artery. While he was speaking primarly of the more concentrated 5 and 10 per cent solutions as used in Great Britain, considerable damage may result from injection of any appreciable amount of a 2.5 per cent solution into an artery. This is not so much because of histologic differences in the intima of a vein and an artery, but because thiopental sodium is a constrictor of the vessels and has a pH of 11. When the solution enters a vein, it is diluted rapidly in the blood stream because the flow is toward larger vessels. If injected into an artery, it is carried to the capillaries with little dilution.

A bulletin issued by the U. S. Army Medical Department[6] suggests two precautions for prevention of inadvertent injection into an artery: (1) carefully check the color of the aspirated blood before starting the injection; (2) inject a few drops, then wait a few seconds. If there is no pain, it may be assumed that an artery has not been entered.

In addition to these tests, carefully palpate the selected vessel before starting the injection to distinguish between a vein and an aberrant artery. This can be accomplished more readily if the cuff of the sphygmomanometer is used to exert pressure rather than the customary piece of catheter tubing, with the additional advantage that the blood pressure can be checked during the course of any anesthesia which is prolonged for more than a few minutes. Beecher[7] has warned that frequent observations of pulse rate and blood pressure levels, traditional with other anesthetics, too often have been neglected with thiopental sodium. Before injection, the cuff should be inflated above the diastolic, but well below the systolic reading. If this is done, the pulsations of an artery are more easily discovered. As soon as the puncture is made, the pressure is entirely released and the character of the flow of blood aspirated into the syringe is noted carefully. Anything less than a steady flow is, of course, a danger signal.

The treatment for injection into an artery is the same as that for leakage into the surrounding tissues, as when a needle slips out of the vessel during induction. This consists of immediate injection of 2 per cent procaine hydrochloride and the application of hot moist packs.[5]

■ *Clogged Needle*

One annoying complication which can be entirely eliminated is that of the clogged needle. When intermittent injection is made with a syringe, it is neces-

5. Mushin, William W., Intravenous Anesthesia. *Practitioner* 161:353 (Nov.) 1948.

6. Inadvertent Injection of Sodium Pentothal into an Artery (Abs.). *Bull. U. S. Army M. Dept.* 86:32 (March) 1945.

7. Beecher, Henry K., Resuscitation and Anesthesia. *Anesthesiology* 7:644 (Nov.) 1946.

sary to aspirate and re-inject every few minutes to keep the needle lumen open. This often results in the use of much larger total dosages than are necessary for the ordinary office surgical procedures, unduly deep anesthesia and an unnecessarily prolonged recovery time. Stevens[8] has advocated a continuous drip technic using a dilute solution of 0.5 to 0.1 per cent thiopental sodium. He prefers a local anesthetic for the main agent, with the thiopental sodium providing only light anesthesia. The rate of the continuous drip is adjusted so that the thiopental sodium enters the circulation only slightly faster than it is normally detoxicated, thus keeping the patient barely asleep.

Adams, Lundy and Seldon[9] discussing the more dilute solutions, do not believe that they offer any particular advantages, and think that the possibility of error during administration is greater. While I agree with Leech[10] that a good general rule for intravenous anesthesia is "the weaker, the safer," I favor the routine use of a 2 per cent solution used with a continuous flow of normal physiologic saline solution. This technic, as advocated by Stallcup[11] keeps the needle patent at all times, and is probably of some value to the patient in maintaining fluid levels. Harang[12] uses 5 per cent dextrose in physiologic saline solution to which 1 Gm. of thiopental sodium has been added, and then injects 2.5 per cent thiopental sodium into the drip a few minutes after induction has begun. Particularly for office anesthesia, Stallcup's method is preferred. An accurate check can be kept on the exact amount of thiopental sodium used, and if it becomes necessary to employ an analeptic to stimulate respiration or hasten the return to consciousness, it can be carried into the circulation with the saline solution. There is no chance of injecting even minimal amounts of additional thiopental sodium along with the analeptic. Pratt[13] uses a system somewhat similar to that of Stallcup.

■ *Laryngospasm*

Laryngospasm is a complication which may occur with other anesthetics, but it is apparently more common with thiopental sodium. While the severity may vary from slight respiratory embarrassment to complete closure of the larynx, it is imperative that the operator correct the spasm in its earliest stages. Equally important are the precautions which, if routinely employed, can usually prevent the onset of laryngospasm.

Premedication should be the first precaution. Atropine, in a dose of 1/150 grain, not only aids in drying secretions, but actually stimulates the respiratory mechanism.[14] Its action is rapid when given intravenously, and because of this some operators mix a 1/100 grain pellet with the thiopental sodium in the

8. Stevens, E. J., Pentothal Sodium: Its Use in Continuous Intravenous Anesthesia and a Method of Preserving It in Solution. *Anesthesiology* 6:376 (July) 1945.

9. Adams, R. C.; Lundy, J. S., and Seldon, T. H., Ten Years of Pentothal Sodium Intravenous Anesthesia; An Evaluation of Its Past, Present and Future. *Anesthesiology* 6:239 (May) 1945.

10. Leech, B. C., Safety Measures in the Practice of Anesthesia. *Canad. M. A. J.* 56:28 (Jan.) 1947.

11. Stallcup, L. B., Pentothal Sodium Anesthesia Using Automatic Control Syringe Method. *J.O.S.* 4:1 (Jan.) 1946.

12. Harang, H. L., Nitrous Oxide-Sodium Pentothal Anesthesia for Oral Surgery. *Anesth. & Analg.* 26:213 (Sept.-Oct.) 1947.

13. Pratt, R. V., A Portable, Self-Contained Apparatus for the Induction and Maintenance of Continuous Intravenous Anesthesia, With Some Observations on the Use of "Pentothal Sodium." *M. J. Australia* 2:626 (Nov.) 1946.

14. Wood, Paul M., Laryngeal Spasm Under Anesthesia; Its Causes and Treatment. *Proc. Am. Soc. for Advancement of General Anesthesia in Dentistry, Inc.*, New York, October 25, 1948, pp. 13, 14, 39.

syringe.[11] I prefer to inject it subcutaneously 15 or 20 minutes before the anesthetic is administered.

The position of the patient during the operation is also important. I believe it safest to have the patient in the recumbent position on the table, or even in the Trendelenburg position. Secretions are then kept in the upper part of the tract where they can be easily aspirated with the suction tip.

Since laryngospasm may occur in the first stages of anesthesia, a mouth prop should be in place from the beginning. Valuable time may be lost in forcing the mouth open to use an aspirator.

Some investigators have said that by rapid injection the total gram dosage can be reduced. The rationale of this procedure is that a high blood concentration of the drug is momentarily produced which delivers a "knock-out" blow to the brain. The advantages of rapidly injected smaller doses are outweighed by undesirable fall in blood pressure[12] and depressed respiration.[15] I prefer the slow and gradual intravenous administration of thiopental sodium, as advocated by Etsten and Himwich.[1] This has had an important effect in reducing the tendency toward laryngospasm.

It has also been suggested that thiopental sodium be used in combination with procaine hydrochloride or nitrous oxide so that the amount of thiopental sodium may be reduced. Harang[12] uses an 80:20 mixture of nitrous oxide-oxygen, and points out that the thiopental sodium so increases the anesthetic potency of nitrous oxide that the latter can be the principal agent and still carry anesthesia to the middle first plane, third stage. Helfman[16] says that even a 40:60 mixture of nitrous oxide-oxygen exerts a definite synergistic action, and reduces the amount of thiopental sodium required. I have used the 50:50 mixture with good results. Barton, Wicks and Livingstone[17] found that the blood oxygen and carbon dioxide were as satisfactory with the 50:50 mixtue as when 100 per cent oxygen was used, with the additional benefit that only one-fourth as much thiopental sodium was required.

Since Quastel[18] has shown that barbiturates inhibit cerebral oxidation, it seems incumbent for the operator to administer oxygen with thiopental sodium anesthetic in amounts greater than the 20 per cent present in atmospheric air. If desired, carbon dioxide can be added to the gas mixture to stimulate respiration and to increase the amount of oxygen available to the brain.[19]

If these precautions are all observed, laryngospasm will seldom occur in any severe degree. When it is encountered, treatment should follow a definite plan:

1. Oxygen under pressure should be increased immediately. Wood[14] has advocated the use of helium with oxygen, since it is lighter and will pass adducted cords where oxygen alone cannot penetrate. This gas is not ordinarily available

15. Pleasance, R. E., Centenary of Anesthesia: Intravenous Anesthesia. *M. Press* 216:467 (Dec.) 1946.

16. Helfman, H., Sodium Pentothal Combined Anesthesia. *Ohio State M. J.* 42:373 (Apr.) 1946.

17. Barton, G. D.; Wicks, W. R., and Livingstone, H. M., The Effect of Pentothal Alone and in Combination With Oxygen or Nitrous Oxide-Oxygen on Arterial Blood Gases. *Anesthesiology* 7:505 (Sept.) 1946.

18. Quastel, J. H., Respiration in the Central Nervous System. *Physiol. Rev.* 19:135 (Apr.) 1939.

19. Clement, F. W., Nitrous Oxide-Oxygen Anesthesia. *Anesthesiology* 7:616 (Nov.) 1946.

for office procedures. Thornton and Rowbotham[20] suggest the use of carbon dioxide to produce an artificial air hunger, which will usually cause the patient to open the glottis.

2. Unless the patient has been intubated previously, the tongue should be pulled forward and a pharyngeal airway inserted.

3. Elliot and Arrowood[21] favor 4 to 10 per cent cocaine sprayed in the pharynx and trachea, to induce topical anesthesia. Good results have been achieved with tetracaine hydrochloride ("Pontocaine").

4. Aspiration with adequate suction should follow. Stallcup[11] forces oxygen under pressure through the nose into the pharyngeal area which brings any foreign material into the throat where it can be removed.

5. If laryngospasm begins in the early stages of anesthesia, the injection of a small additional amount of thiopental sodium usually will suffice to deepen the anesthesia and stop the spasm. (While this appears to be the procedure of most operators who have written on the subject, others[21] have reported that such deepening of the anesthesia overcame the coughing, but that the patient became cyanotic and apneic.)

6. Intravenous injection of 1/50 grain of atropine should be the next step. Atropine has a specific effect on the vagus nerve in breaking a reflex laryngospasm. When a continuous drip saline infusion is being used, much valuable time can be saved by injecting the atropine directly into the rubber tubing.

7. Any attempt to pass an endotracheal tube during laryngospasm probably tends to increase the spasm. The action of any topical anesthetic is too slow to provide sufficient anesthesia for this purpose, and curare offers the only solution. I believe that curare should be a part of the emergency drug tray, and would not hesitate to use it in extreme cases. Time is of primary importance in the anesthetic emergency. Again it is an advantage to have used the continuous flow of saline solution, because curare injected in the presence of concentrated thiopental sodium would cause a precipitate and might clog the needle. Since the reversal period for anoxemia of the cerebrum may be as little as four minutes, and never longer than eight, it is important to have an adequate record of the time of onset of the complications, whether respiratory or cardiac. The armamentarium should include a stopwatch or a five minute "hour glass" which can be started the moment that any difficulty is noted. The hour glass wall boards used in hospital operating rooms for hand scrub timing are excellent for this purpose. Only by knowing exactly the duration of a crisis can the surgeon decide when extreme procedures are justified.

8. The patient should be placed in the Trendelenburg position immediately if this has not already been done. Muscular paralysis caused by curare might be sufficient for oxygen under pressure to enter the esophagus and force the gastric contents into the throat where rapid re-

20. Thornton, H. L., and Rowbotham, Stanley, Anesthesia in a Maxillo-Facial Surgical Unit with the British Liberation Army. *Anesthesiology* 6:580 (Nov.) 1945.

21. Elliot, H. L., and Arrowood, Julia G., Anesthesia for Oral Surgery in the Presence of Cautery and Diathermy. *Anesthesiology* 6:32 (Jan.) 1945.

moval with the aspirator would be a vital procedure.

9. Since curare is a respiratory depressant, and thiopental sodium has a slight curare-like action of its own, the operator must be prepared to intubate and to provide artificial respiration until restoration of normal breathing. Neostigmine (1 cc. of 1:2,000 solution), which is the physiologic antidote for a toxic dose of curare, should be on the emergency tray.[22] Pleasance[15] says that ill effects from stimulating the vagus nerve with neostigmine are improbable because curare has partly inhibited it. In experimental animals at least, Koppanyi and Vivino[23] demonstrated that the addition of ephedrine to neostigmine in curare intoxication produced a better antitoxic effect.

Recently there have been encouraging reports on the new synthetic drug "Myanesin" (3-ortho-tolaxy-1, 2-propanediol). Mallinson[24] has stated that laryngeal spasm occurring under thiopental-gas-oxygen from any cause can be rapidly controlled with an injection of "Myanesin." While it still must be regarded as experimental, it may take its place as a valuable addition to our emergency drug tray. It is claimed that "Myanesin" has advantages over curare and possesses a wider margin of safety.

10. The extreme treatment for laryngospasm is tracheotomy, but curare, with all its inherent dangers, is to be preferred. Emergency tracheotomy instruments are a "must" for anyone engaged in the practice of oral surgery. Unless laryngospasm has been further complicated by a retained foreign body in the larynx, curare should be sufficient. This does not suggest that the operator should ever hesitate if tracheotomy is indicated. Four minutes of respiratory arrest from any cause is the limit of safety without the chance of irreversible changes.

■ *Cardiac Arrest*

The problem of cardiac arrest, while occurring with no greater frequency with thiopental sodium than with any other general anesthetic, should be given some consideration. Any drugs injected should certainly be administered intravenously. Even with lowered blood pressure, Beecher[7] has stated that sluggish peripheral circulation will greatly retard the absorption of any drug administered subcutaneously or intramuscularly.

While it can be argued that in any case of complete cardiac arrest it is useless to inject into the peripheral circulation, in practice it is difficult to determine the exact instant when circulation has ceased. Always make intravenous injection before trying more heroic measures. I prefer the sympathomimetics such as epinephrine and phenylephrine hydrochloride ("Neo-Synephrine"). Aminophylline has been recommended by some authorities. Intravenous injections of epinephrine are given in doses of 3 to 5 cc. in 1:100,000 solution.

In complete cardiac arrest, three minutes is believed to be the maximum time for resuscitation. Pounding with the closed fist over the heart at a rate of 50

22. Cole, Frank, The Use of Curare in Anesthesia: A Review of 100 Cases. *Anesthesiology* 6:48 (Jan.) 1945.

23. Koppanyi, T., and Vivino, A. E., Prevention and Treatment of D-Tubocurarine Poisoning. *Science* 100:474 (Nov.) 1944.

24. Mallinson, F. Barnett, A New Synthetic Curarising Agent in Anesthesia. *Lancet* 1:98 (Jan. 18) 1947.

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to 60 times per mintues with a severe, definite blow, may be tried for a few seconds.[24] If the emergency persists, the operator must then either inject directly into the heart, or attempt direct heart massage. Burstein[25] has pointed out that in general anesthesia the cardiac conducting mechanism may become so sensitized that ventricular fibrillation and death may occur from the injection of sub-therapeutic doses of epinephrine. Bailey[26] says that he no longer wastes time in injecting epinephrine into the ventricle, but immediately starts cardiac massage. While it is granted that such extreme emergencies would rarely occur in dental office anesthesia, anyone who operates under general anesthesia should know how to make this last effort, should the occasion arise. A conscientious surgeon will familiarize himself with the technics for cardiac massage, both by the subdiaphragmatic approach and by opening the chest wall between the third and fourth ribs.

Barber and Madden[27] reviewed the world literature on cardiac resuscitation up to 1945. They found the total reported cases of direct manual massage of the heart to be 143, of which 33 per cent were completely successful. Such success by injection of epinephrine into the heart has never been reported.

■ *Summary*

1. Thiopental sodium ("Pentothal") is a good anesthetic for office surgical procedures if the operator has sufficient equipment and assisting personnel.

2. Most complications will never arise if the proper precautions are taken.

3. It is important to have an accurate record of the duration of the complication so that the surgeon will know what resuscitative measures are justified. A stopwatch or five minute glass should be a part of the equipment.

4. Emergency treatment should follow an orderly pattern.

5. The oral surgeon should know how to do an emergency tracheotomy and a direct cardiac massage, even though the necessity probably will never arise.—*302 North Eighth Street.*

25. Burstein, C. L., Misuse of Adrenalin and Coramine; Altered Drug Effects During Anesthesia. *Am. J. Surg.* 73:102 (Jan.) 1947.

26. Bailey, H., Impending Death Under Anesthesia. *Lancet* 1:5 (Jan. 4) 1947.

27. Barber, R. F., and Madden, J. L., Historical Aspects of Cardiac Resuscitation. *Am. J. Surg.* 70:135 (Oct.) 1945.

■ CANCER

There is no unqualified yes or no answer to the question, "Should the elderly cancer patient be told the truth?" The author states: "We have no right to any preconceived attitudes towards our patients. A patient who pleads to be told the truth may actually want to be deceived; another may ask for poison with which to commit suicide, yet not expect the doctor to give him any. Or we may act in the conviction that the truth is expected and soon find out that we have been mistaken." —*R. Ginzberg, "Should the Elderly Cancer Patient Be Told?" Geriatrics 4:101, 1949.*

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Mouth cancer: the dentist's opportunity for early treatment and control

■ *Harry C. Saltzstein, M.D., and Robert S. Pollack,* M.D., Detroit*

With the present day publicity given to cancer, and the large amount of energy expended in lay education, increased responsibility comes to both physician and dentist for the early recognition of this disease. A recent survey by Leach and Robbins[1] showed that in 27 per cent of the cancer patients in their series the physician was responsible for delayed treatment. It is obvious, therefore, that increased vigilance is needed on the part of the medical and dental professions in the early recognition of this disease to keep pace with an enlightened laity.

Cancer of the mouth[2] in the early stages rarely causes pronounced symptoms. The average person, when first suspecting a growth within the mouth, often thinks of his dentist first, because the lesion appears to be related to his teeth. Martin[3] reported that the opinion of the dentist was sought first in 60 per cent of patients with tumors of the gingiva, and in 20 to 35 per cent of patients with tumors involving the floor of the mouth, anterior two thirds of the tongue, buccal mucosa and hard palate.

In a small personal series of 36 patients, 15 (42 per cent) consulted their dentist first (Table 1). In only 2 cases there was no delay in treatment. In the remaining 13 there was an average delay of 4.5 months before definitive treatment was given, the maximum loss of time being 12 months. All of the 13 patients received some form of treatment, either new dentures (6 patients), extractions (10 patients, some of these also had new dentures) or oral hygiene, before the patient was referred for definitive treatment for his tumor. In no case was a preliminary biopsy performed.

These figures are interesting because they involve the dentist in a field beyond what he may consider the actual realm of dentistry.

■ *General Considerations*

The majority of our patients (26 of the 36, or 72 per cent) were in the sixth and seventh decades, but mouth cancer is not unusual in younger people. The youngest patient was 37 and had an extremely aggressive cancer of the floor of the mouth. The ratio of men to women was 2.5:1.

Of the 36 patients in the series 17 mentioned that the growth developed opposite a broken or sharp tooth or ill fitting denture. Three had had leukoplakia. In 6 cases there was no antecedent irritation.

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1. Leach, John E., and Robbins, Guy F., Delay in the Diagnosis of Cancer. *J.A.M.A.* 135:5 (Sept. 6) 1947.

2. Includes cancer of the gingiva, tongue, buccal mucosa, floor of the mouth, hard and soft palate and anterior tonsillar pillar.

3. Martin, Hayes, Mouth Cancer and the Dentist. *J.A.D.A.* 33:845 (July 1) 1946.

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Table 1

15 patients with mouth tumors who saw their dentist first

Site	Treatment	Biopsy	Delay
Floor of mouth	All teeth extracted. Cauterized with silver nitrate	None	9 months
Floor of mouth, right anterior tonsillar pillar and base of tongue	Extraction of all teeth. New dentures	None	5 months
Floor of mouth, anterior	Local excision of leukoplakia. Developed cancer 2½ years later	None	None
Hard palate, buccal mucosa, and left maxilla	Tooth extraction. Denture Refitted.	None	5 months
Upper left gingival margin and soft palate	Oral hygiene	None	2 months
Upper right alveolar ridge*	Dentures refitted. Several teeth extracted	None	3 months
Floor of mouth	Tooth extraction	None	2 months
Tongue, right lateral border	All teeth extracted. New dentures	None	5 months
Floor of mouth, right lateral	New dentures	None	12 months
Tongue, right lateral border	New dentures	None	1 month
Lower gingiva, right anterior	Several teeth extracted	None	1 month
Upper left gingiva and buccogingival sulcus	None	None	None
Left buccal mucosa	Several teeth extracted	None	12 months
Left buccal mucosa and buccogingival sulcus	All upper teeth extracted	None	4 months
Right lower gingiva	Several teeth extracted. Oral hygiene. New dentures	None	9 months

* Benign lesion, odontoma

In 10 cases no note was made of this data on the chart. Although the majority of mouth cancers are associated with chronic irritation from ragged tooth edges and ill fitting dentures, a certain number start from leukoplakia and smokers patches. Martin[4] believes that leukoplakia is more important than has been emphasized heretofore. Other conditions which are commonly seen with oral cancer are poor hygiene and vitamin B complex deficiency. This latter causes inflammation of the mucous membranes and leads to cracking and fissuring of the epithelium.

Most cancers of the oral mucous membranes start as small indurated ulcers which infiltrate into the surrounding tissues. A few start as papillomas or within an indurated area without ulcer formation. Malignant glandular tumors such as cylindromas and mixed tumors with intact overlying mucous membranes do oc-

4. Martin, Hayes, Cancer of the Head and Neck. *J.A.M.A* 137:1306 (Aug. 7) and 137:1366 (Aug. 14) 1948.

Table 2

Clinical review, series of 36 patients

Primary site	Number	State of disease			Symptoms in order of frequency	Duration, clinical history (average)
		Early	Mod. adv.	Advanced		
Floor of mouth	5		3	2	Pain, noticed lesion, swelling in mouth	14 months
Tongue (all surfaces)	9	2	4	3	Pain, noticed lesion, difficulty swallowing	4 months
Lower gingiva	4		2	2	Ill fitting denture, pain, loose teeth	8 months
Upper gingiva, some with extension to soft and hard palate, buccal mucosa and maxilla	4	1		3	Ill fitting denture	2 months
Hard palate	3		1	2	Ill fitting denture, noticed lesion	5 months
Anterior tonsillar pillar with extension to soft palate and upper alveolar ridge	3		1	2	Pain swallowing, ill fitting denture, noticed lesion	6 months
Buccal mucosa, buccogingival sulcus	6		5	1	Noticed lesion, pain, bleeding	11 months
Mucosal border upper lip	1		1		Noticed lesion	3 months
Postpharyngeal wall	1		1		Pain swallowing	5 months

cur, but are not common in the tongue, the floor of the mouth or buccal mucosa.[5]

We have listed in Table 2 the early symptoms according to their primary sites. Those patients with tumors of the anterior tonsillar pillar first noticed pain on swallowing. Patients with tumors on the gingiva and hard palate first noticed ill fitting dentures. Cancers of the buccal mucosa produced no true symptoms and it was only when these patients felt the lesion that they realized something was at fault. In tumors along the floor of the mouth and tongue pain was the first symptom. Twelve of the 14 patients whose tumors arose in these sites had moderately advanced or advanced lesions when first examined. Early tumors along the floor of the mouth, tongue and buccal mucosa are usually insidious in onset; hence the longer duration of clinical symptoms and the higher proportion of moderately ad-

5. McDonald, John R., and Havens, Fred Z., A Study of Malignant Tumors of Glandular Nature Found in the Nose, Throat and Mouth. *Surg. Clin. N. Amer.* Mayo Clinic Number: 1087 (Aug.) 1948.

vanced and advanced cases even in this small series. In 14 of the 36 patients pain was the first symptom which drew attention to the lesion. Pain is a relatively uncommon symptom of early oral cancer. As the tumor progresses it becomes infected with the numerous anaerobic bacteria so prevalent in the mouth, and it is at this stage that the cancer becomes painful. Pain is invariably present in the later stages.

Within a short period the more familiar picture of debility and emaciation begins. Caloric intake is reduced owing to pain on swallowing, and the patient changes rapidly from a healthy to a chronically ill individual, often losing 40 to 60 pounds. This may happen within a few months.

Because the mouth is the harbinger of many infections and because early cancer is so frequently unrecognized, any lesion that arouses even the slightest suspicion should be subjected to immediate biopsy. With a histologic knowledge of the lesion, intelligent treatment can be instituted without delay.

If the lesion proves to be cancer a relatively uncomplicated procedure may be all that is necessary to treat it effectively.

■ *Report of Cases*

In order to illustrate some of the various problems one is confronted with both in the diagnosis and treatment of these tumors, as well as what results might be obtained, these case reports are presented.

CASE 1—The patient, an 80 year old white man was first seen on May 1, 1937. He complained of soreness in the upper left alveolar ridge and hard palate of one month's duration. He had worn dentures for many years, and recently noticed that the left side of the upper denture slipped out of place frequently, injuring the gingiva. A moderate amount of tenderness was felt beneath the denture. There was no difficulty in eating or swallowing and he had not lost any weight. He consulted his dentist first and immediately was referred to this office.

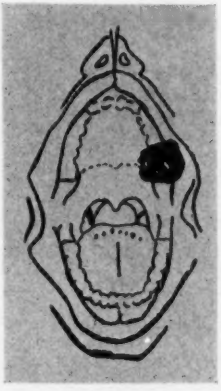


Fig. 1

Examination—Examination revealed a small ulcer, 1.5 cm. in diameter, on the upper left alveolar ridge (Fig. 1). The lesion involved a small portion of the hard palate and the adjoining mucosa along the buccogingival sulcus. The center of the ulcer was deep and excavated. The edges were raised and stony hard. There was no surrounding border of induration and the oral cavity elsewhere was normal. There were no enlarged lymph nodes palpable in the neck. The biopsy report was squamous cell carcinoma.

Treatment—On May 5, 1937, the tumor was excised by electrocautery and the region was cauterized thoroughly. On June 5, ten radon seeds totalling 7.5 millicuries were implanted in the cauterized region. Healing was slow but progressive.

In August, the patient complained of pain over the left side of his face and

upper left jaw, corresponding to the division of the maxillary branch of the trigeminal nerve. An alcohol injection over this nerve was given on two occasions with noticeable relief. On December 1, an enlarged lymph node was palpated in the upper left jugular region. It was exposed under local anesthesia, and six radon seeds, each of 1 millicurie strength, were implanted in the node. The postoperative course was uneventful and there was no evidence of recurrence for the next five and one-half years.

In July, 1943, a recurrent ulcer was noted in the primary site. Biopsy was positive for carcinoma and the patient was given roentgen therapy to this region. The tumor did not regress, however, and the patient ran a steadily downhill course. Because of his advanced age, treatment was temporized somewhat. He died of cancer almost seven years after his first visit.

Comments—We have frequently obtained the history that a denture has been worn comfortably for years and then becomes loose and fits poorly. After irritation and soreness of only a few months an active cancer may develop. Cancers in the posterior portion of the mouth along the buccogingival sulcus are of notoriously grave prognosis. However, early treatment was given this patient. Electrocautery plus radon seed implantation under local anesthesia were well tolerated and afforded long term palliation.

CASE 2—The patient, a 43 year old white woman who was first seen on August 21, 1941, complained of a small lump on the inside of her left cheek. She stated that the lump started as a small lesion six months previously and had grown slowly. It was situated just opposite a ragged upper left molar which had caused constant irritation of the adjacent buccal mucosa. She consulted her dentist a short time after noticing the lesion. He advised extraction of all her upper teeth. The teeth were extracted, but the lesion continued to grow. A visible swelling of the left side of the face developed externally, and the lesion became slightly painful. The patient had difficulty in eating and lost weight.

Fig. 2

Examination—The lesion was a round, firm mass located on the left buccal mucosa (Fig. 2). It was 1.5 cm. in diameter, with a surrounding indurated border and shallow excavated center. The edges were raised and rolled. The tumor extended into the buccogingival sulcus and appeared to be in close contact with the mandible. Two large gold crowns along the lower gum irritated the inferior margin of the tumor. Further examination was unremarkable. There were no enlarged cervical lymph nodes. A specimen was taken for biopsy and reported to be squamous cell carcinoma.

Treatment—On August 22, 1941, the remaining teeth were extracted. After oral clean up and healing a wide cautery excision of the tumor was performed on August 30. However, within two weeks

a suspicious area was seen within the scar which, on biopsy, was positive for squamous carcinoma. Further cautery excision and coagulation were performed. On October 10, seven radon seeds, each of 1 millicurie, were implanted in the region of excision. Healing was quick, progressive and without incident. Follow-up examinations over the next three years showed no evidence of recurrent disease. When last seen, three years after the operation, new dentures were being made.

Comments—After irritation has existed for a variable length of time, measured in months, or perhaps years, the cause of irritation can be removed, but the cancer will progress. This is a general principle, and is true of cancer in other body regions as well. Extraction of the teeth, and especially of the one causing constant irritation of the buccal mucosa, had no direct effect on this patient's cancer.

Cancers of the buccal mucosa are often in close proximity to the mandible, and it is difficult to be certain whether the mandible is invaded by new growth or merely is involved by inflammatory reaction. For this reason, we have, at times, waited ten days or two weeks after cautery destruction, and then taken biopsies from the healing edge of the wound.

CASE 3—A 57 year old white man, first seen on April 26, 1946, complained of a small lesion on the right side of the under surface of his tongue. About three years previously his local physician had removed a leukoplakic patch from this region. He was advised to stop smoking, but continued to smoke six cigars daily. He had been wearing a lower bridge for five years. His dentist had urged him to have all of his lower teeth extracted at the time the bridge was constructed, but the patient refused to have this done. The bridge was ill fitting, and tended to irritate the tongue in the adjacent area. Four months before his first visit to this office, a small lesion developed on the tongue within the irritated area and continued to grow. It became painful, and eating was difficult, but the patient did not lose any weight.

Examination—Examination revealed a small papillary tumor, 0.5 cm. in diameter, which was situated in the middle third of the right under surface of the tongue and floor of the mouth (Fig. 3, *A*). The base was indurated, the tumor firm, reddened and granular. It was slightly tender but did not bleed easily on trauma. An area of beginning ulceration, about 0.5 cm. in diameter, was seen in the mucosa along the posterior aspect of the tumor base. There was a surrounding area of leukoplakia along the floor of the mouth and additional fine leukoplakic patches on the opposite side of the tongue and floor of the mouth. Further examination was negative. There were no enlarged lymph nodes palpable in the neck.

Treatment—The patient was admitted to the hospital for excision of the tumor. A preliminary biopsy was made but it did not reveal carcinoma. The lesion showed no evidence of healing, and a second biopsy was then performed within a few days and was reported as squamous cell carcinoma. On April 29, a wide local excision of the tumor was performed. Six radon seeds of 1 millicurie each were injected into the operative site on the second postoperative day. The

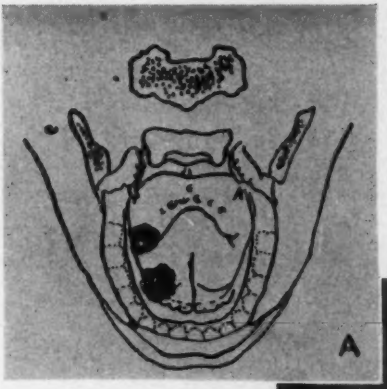


Fig. 3.—A: Drawing showing small papillary tumor situated in the middle third of the right under surface of the tongue and floor of the mouth. The base was indurated, the tumor firm, reddened and granular

B: The patient after treatment, which consisted of hemiglossectomy and upper neck dissection

wound healed without difficulty and the postoperative course was unremarkable. The microscopic report of the operative specimen was early squamous cell carcinoma. The patient remained well until October 1946, at which time another small ulcer measuring 4 mm. across was noted along the right lateral border in the middle third of the tongue. Biopsy was reported as squamous cell carcinoma. There were no palpably enlarged cervical lymph nodes. On October 24, a right hemiglossectomy and upper right neck dissection were performed (Fig. 3, *B*). Microscopic report of the tumor was squamous cell carcinoma, but there were no metastases in the lymph nodes. The postoperative course was uneventful and the patient left the hospital on the seventh postoperative day. Articulation and speech were satisfactory. When last seen two years after the major operative procedure, the patient showed no evidence of recurrent cancer.

Comments—A negative biopsy can lull one into a false sense of security.

In general, a good rule to follow is that any mouth ulcer which does not heal after two weeks of conservative treatment should be regarded as cancer until a differential diagnosis is made. The second tumor, probably a recurrence of the first after six months, did not spell failure because it was apprehended and radically treated immediately.

The value of a neck dissection in the absence of palpably enlarged lymph nodes is a much debated question and each case demands individual consideration. In this case the tumor was recurrent and had been treated previously. It was, therefore, deemed best to remove the adjacent upper neck lymph nodes.

CASE 4—On August 30, 1939, a white woman, aged 55, complained of a lesion on the right side of her tongue of 2 months' duration. Two years previously she had noticed the onset of a white patch situated in the same region. She had been wearing upper and lower dentures for 15 years. The dentures were well fitting and caused no trouble.

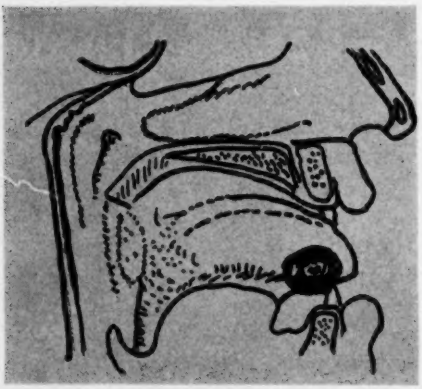


Fig. 4.—Line drawing of tumor on the right anterolateral aspect of the tongue. It was not ulcerated and had clearly defined, slightly raised borders, without surrounding induration

Examination—The patient presented a raised, hard tumor, measuring 2 by 2.5 cm. situated on the right anterolateral aspect of the tongue (Fig. 4). It was not ulcerated and had clearly defined, slightly raised borders, without surrounding induration. There were no palpably enlarged lymph nodes in the neck. Biopsy revealed squamous cell carcinoma. On September 3, a hemiglossectomy and upper right neck dissection were performed. Figure 5, *A* is a photomicrograph of the lesion. One node in the submaxillary triangle showed metastatic carcinoma (Fig. 5, *B*). Accordingly, one month later a lower neck dissection was done. The microscopic report of this specimen was negative for metastases. Convalescence was rapid after each surgical procedure. Speech and articulation returned quickly and almost to normal. There has been no evidence of recurrence during the past 10 years.

Comments—This tumor apparently developed on the site of a previous leukoplakic patch, and, according to the patient's history, without the additional factors of chronic irritation from poor dentures and teeth. In this case a prophylactic upper neck dissection was done because of the relatively large size of the tumor. When microscopic examination revealed metastases in the nodes, further neck dissection was performed.

Most cancers of the tongue start on the lateral border.[6] Those in the anterior

6. Martin, Hayes; Munster, H., and Sugarbaker, E. D., Cancer of the Tongue. *Arch. Surg.* 41:888 (Oct.) 1940.

Fig. 5.—A: Photomicrograph of original lesion in the tongue. B: Section from lymph node in the right submaxillary region revealed carcinoma

third have the most favorable prognosis. Of the several methods of treatment, excision by scalpel, destruction by cautery, radon seed implantation, oral or external roentgen therapy, we prefer surgical removal. A well localized lesion on the side of the tongue is easily removed by hemiglossectomy. The morbidity is minimal, the deformity not great and the involved region is removed with less worry about local recurrence.

In this case no lymph nodes were palpable in the neck, yet on microscopic examination metastatic cancer was found. The rationale of prophylactic neck dissection is still a moot point. The evidence on which one's decision is made rests on careful follow-up studies which contain large enough numbers of similar cases to be statistically significant. In cancer of the lip it has been shown[7] that if the primary tumor is controlled routine prophylactic neck dissections will not increase the number of cures enough to justify the procedure. More recent studies have shown that once the primary growth in the tongue is controlled, neck node metastases are not as frequent as had been thought. The present trend is to wait, with careful follow-up examinations, until nodes are palpable. Reliable sources,[6] however, have shown that more than 60 per cent of patients with cancer of the tongue will develop neck node metastases. It is difficult, therefore, to state definitely that "no prophylactic neck dissections" will be the dictum in years to come.

There is no justification for prophylactic radiation of the entire neck because

7. Cross, J. E.; Guralnick, Eugene, and Daland, E. M., Carcinoma of the Lip. *Surg., Gynec. & Obst.* 87:153 (Aug.) 1948.

through a portal of this size the skin cannot possibly withstand a dosage sufficient to kill any latent or microscopic cancer.

CASE 5—A 65 year old white man who was first seen on July 2, 1945, complained of a lesion on his tongue of 4 months' duration. He had been wearing dentures for eight years. Recently he noticed that a tooth edge along the right side of his lower denture was sharp and irritated his tongue. A small ulcer developed on the tongue in this region and the patient consulted his dentist. New dentures were made for him and oral hygiene was advised, but the ulcer continued to grow and soon became painful. He consulted his doctor next who advised him to go to one of the nationally known clinics for an opinion. A specimen was taken for biopsy which revealed squamous cell carcinoma. The patient left without treatment and returned to his family physician, who in turn referred him to this office. The tumor had increased rapidly in size shortly before he was examined here.

Examination—On examination the patient presented a large, dirty ulcer, 1.5 cm. in diameter, in the middle third of the right lateral border of the tongue (Fig. 6, left). It was surrounded by an indurated border 1 cm. wide. The edges were raised and rolled, the center dirty and necrotic. It was well limited to the tongue and did not invade the mucous membrane of the floor of the mouth. A lymph node which was slightly enlarged was felt in the right subdigastric region and was thought to be positive for metastases. Further examination was negative.

On July 25, 1945, a right hemiglossectomy was performed (Fig. 6, right). The postoperative course was uneventful

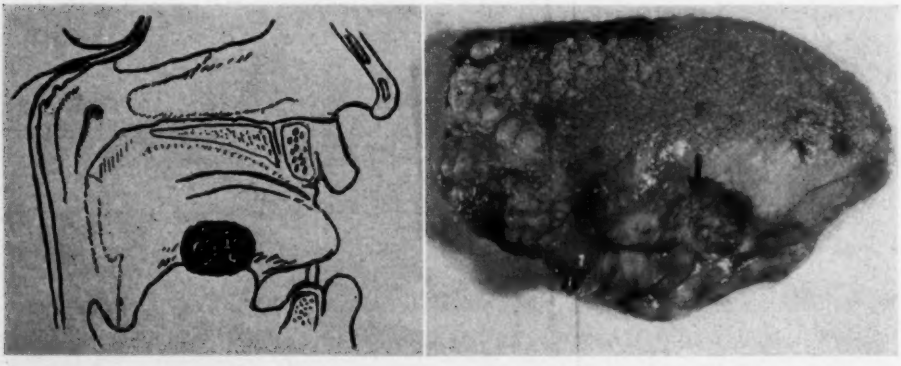


Fig. 6.—Left: Drawing of large ulcer in the middle third of the right lateral border of the tongue. It was surrounded by an indurated border. The edges were raised and rolled, the center dirty and necrotic. It was limited to the tongue and did not invade the mucous membrane of the floor of the mouth. Right: Gross specimen; arrow points to ulcer. Neck node metastases developed, for which patient refused treatment. Death resulted from lymphatic spread; primary growth was well controlled

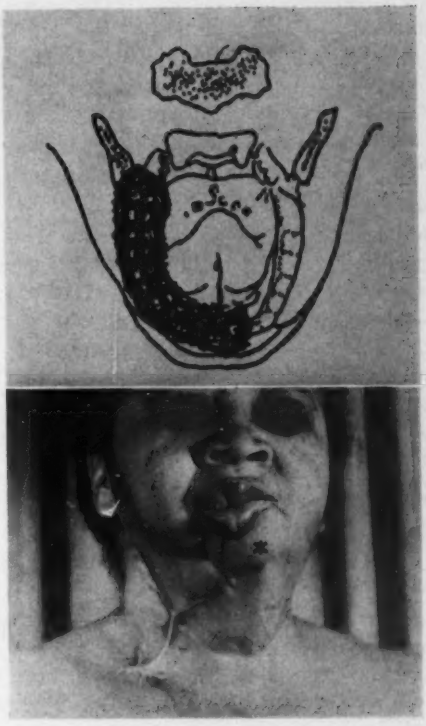


*Fig. 7.—Above: Drawing of large sloughing ulcer on the middle third of the right lateral border of the tongue. It involved the entire right lower gingiva from the tonsillar pillar to beyond the midline of the mandibular symphysis. There was infiltration along the floor of the mouth and buccogingival sulcus. Below: patient after treatment, which consisted of radical neck dissection, removal of the right mandible and disarticulation at the temporomandibular joint. The * marks site of division of the mandible, 2 cm. to the left of the midline. When the mandible is divided at the midline the deformity is much less*

and the tongue healed by first intention. Because of the persistence and gradual increase in size of the lymph node previously felt in the right subdigastric region a radical neck dissection was advised, but the patient consistently refused further surgical treatment. The metastatic node continued to grow and his condition deteriorated. There was no evidence of recurrent disease in the tongue but he developed more neck node metastases. Difficulty in swallowing was noted in July, 1946, and became acute. On August 26, a Janeway type of gastrostomy was performed, but the patient did not rally. He died suddenly on August 30, 1946, 13 months after his first operation.

Comments—Death was due to neck node metastases which progressed to the point of causing dysphagia. The primary tumor was completely controlled throughout its course and presented no problem. Once an enlarged lymph node is palpable in the neck no delay should be lost in doing a thorough and completely radical neck dissection. Experience has shown that this, by far, gives the patient the best chance of cure.

This patient was rather hard to handle, but if our advice in such matters is refused, the fault may be due to our own powers of persuasion; either a faulty estimate of the patient's grasp of the situation or failure to impress upon him the seriousness of his condition. Leach and Robbins[1] have commented upon this difficulty: "For want of a better expression, this might be called lack of salesmanship."

CASE 6—A Negro woman, aged 62, was first seen on April 23, 1948, com-

plaining of a large ulcer along the lower right gingiva. In June 1947 she noticed a small, nontender ulcer on the posterior aspect of the right gingiva. She consulted her dentist promptly and, being edentulous, was told that her present dentures were badly constructed and that she needed new ones. Mouth washes and oral hygiene were administered but without any regression in the ulcer. It became progressively larger and the patient was unable to wear the new dentures which had been made for her. She consulted a second dentist who also advised oral hygiene and clean up. The tumor continued to grow, and therefore, she consulted a physician who could offer no treatment but referred her back to her dentist. She then sought another physician, and was ultimately seen by us. Throughout her course there had been no pain or difficulty in swallowing. She was unable to wear her dentures and had been getting along well on a soft diet. There was no weight loss.

Examination—The patient presented a large, sloughing ulcer which involved the entire right lower gingiva from the tonsillar pillar to beyond the midline of the mandibular symphysis (Fig. 7, above). There was infiltration along the floor of the mouth and buccogingival sulcus. No trismus was present and there were no enlarged cervical lymph nodes. A biopsy revealed squamous cell carcinoma.

Treatment—The patient was admitted to the hospital and a one stage operation was performed on May 20, 1948. This included a right radical neck dissection from the clavicle to the mastoid process, removal of the right mandible, transecting it 2 cm. to the left of the midline of the symphysis, and disarticulation at the temporomandibular joint (Fig. 7, below). The lateral third of the tongue and the buccogingival sulcus were resected with the specimen. The patient's postoperative course was unremarkable. On the tenth postoperative day she had a plastic repair of the tongue, and was discharged 13 days later.

Follow-up examination over the next fourteen months showed no evidence of recurrent disease. The patient maintains herself well on a soft diet. There has been no weight loss, and her speech and diction are adequate. She is free of complaints and carries out her normal activities without restriction.

Comments—This case presented a veritable odyssey of wanderings from dentist to physician to dentist, while a rapidly growing carcinoma invaded most of the right lower jaw, and the treatments the patient received were incidents only in the forward progression of the disease.

With the advent and popularity of intraoral irradiation therapy, patients with carcinoma of the gingiva involving the mandible were taken out of the domain of the surgeon and turned over to the radiologist. Results were never satisfactory. The mucosal covering of the bone is thin. Painful radiation necrosis of the mandible which lasts for months frequently follows adequate treatment either by radon seeds or roentgen ray. Also, years of follow-up experience have shown a low cure rate.

Since the rise of present day surgery, and the protection which antibiotics, large amounts of blood and better anesthesia have given, the previous high mortality of intraoral and neck operations has been

eliminated. The procedures are tedious and exacting, but convalescence is easy and rapid, pain is relieved, and the deformity is not great. Surgery restores the concept of excision and dissection in continuity of the cancer and the adjacent lymph node regions which have been so successful in the treatment of cancer in other body regions such as breast, rectum and lower extremity. It is applicable in a large variety of extensive intraoral cancers which have up to now been considered hopeless. For growths such as is described in the foregoing case, in which the neck is not involved, prophylactic neck dissection is done because scarring makes subsequent neck dissection distorted and difficult, and experience has shown that these extensive oral growths sooner or later metastasize to the neck.

■ *Summary and Conclusions*

1. A small group of intraoral cancers is analyzed chiefly from the point of view of the dentist's problem in apprehending these cases early. There is often considerable delay and treatment is instituted which has no effect upon the cancer.

2. Six illustrative case reports are presented. The problems of different forms of treatment are discussed.

3. The management of early cases of intraoral cancer is relatively simple. These respond well, as a rule, to local excision with cautery or scalpel, to radon seed implantation, either as a supplementary procedure or as the sole treatment, or to oral and external roentgen therapy.

4. The existence of cervical metastases changes the entire procedure. It is relatively easy to control and eradicate primary intraoral cancers but the treatment of cervical metastases is a much more difficult and complicated problem. A single, nontender, slightly enlarged node in the neck is highly suspicious of cancer. It may be present without any symptoms indicating an intraoral lesion. The treatment of cervical metastases from intraoral cancer in the curative stage is surgical intervention.

5. There has been a return to the principle of combined neck, jaw and mouth dissection in continuity for carcinoma involving the mandible and the larger intraoral growths. This has placed many heretofore hopeless cases in the category of potential "cures."—*966 Fisher Building.*

■ DENTAL EXTRACTION

The seriousness of bacteremia and the possibility of subsequent development of endocarditis following extraction of teeth warrants prophylactic administration of "slow" penicillin in two doses of 300,000 and 600,000 units, twenty-four and three to four hours, respectively, prior to extractions. Such treatment appears to reduce the incidence of bacteremia due to alpha and gamma streptococci. —*H. L. Hirsh, et al., "Effect of Prophylactically Administered Penicillin on Incidence of Bacteremia Following Extraction of Teeth," Arch. Int. Med. 81:868, 1948.*

UMI

Present status of procaine toxicity

■ *Julian S. Sachs, D.D.S., New York*

Toxic reactions from procaine hydrochloride fall into two categories, idiosyncrasy and true toxicity. Idiosyncrasy is defined as an abnormal or unusual response to a drug. True toxicity is a poisoning effect of a normally safe drug when taken in excessive dosage. The purpose of this paper is to re-evaluate the status of procaine toxicity and idiosyncrasy in the light of recent experiments and research.

The toxicity of intravenous procaine has been established in the cat,[1] rabbit,[2] guinea pig[3] and dog.[4] The average minimum lethal dose in experimental animals is 40 mg. per kilogram. The lethal dose in man is not known. Toxic manifestations are the result of central medullary paralysis due to critical blood levels.[4]

■ *Intravenous Procaine*

Graubard, Robertazzi and Peterson[5] administered more than 2,000 intravenous infusions of procaine hydrochloride for the control of pain in inflammatory and traumatic conditions. The "procaine unit" was used to calculate the amount of the drug given. The unit is 4 mg. per kilogram of body weight dissolved in 1/10 per cent isotonic saline solution and administered over a period of 20 minutes. Thus a 70 Kg. man would receive 280 mg. of procaine in 280 cc. of isotonic saline solution in 20 minutes.

Typical signs and symptoms as observed by Graubard, Robertazzi and Peterson during administration of the infusion are given in the following paragraph:

About five to seven minutes after the start of the infusion, the patient usually describes a sensation of warmth throughout the entire body. A flush is sometimes noted over the head, face and neck, except for a marginal circumoral pallor. Soon after the onset of this flush the patient notes a dryness of the mouth, sometimes accompanied by a metallic taste, tearing of the eyes, dilatation of the pupils and light-headedness. Many patients feel comfortably relaxed with alleviation of the pain. In our administration of procaine we strive not to exceed these manifestations. The more severe responses to this drug which we have noted on occasions, and which we consider undesirable, are marked dizziness, apprehension, sensation of trembling, or sleepiness beyond comfortable relaxation. We have had two instances of momentary unconsciousness, but at no time has the use of sedatives been necessary. To date after 2,000 administrations we have noted no cases of *procaine sensitivity* or any contraindications to the use of the drug.

Burstein[6] reports intravenous injections of 30 to 70 mg. of procaine in anes-

1. Eggleston, C., and Hatcher, R. A., Pharmacology of Local Anesthetics. *J. Pharm. & Exper. Therap.* 13:433 (Aug.) 1919.

2. Meeker, W. R., and Frazer, E. B., Comparative Toxicity of Novocain, Neocain, Procain and Apothesine, Effect of Intravascular Injections. *J. Pharm. & Exper. Therap.* 22:375 (Dec.) 1923.

3. Schumacker, H. B., Jr., Some Observations on the Rate of Absorption from Various Tissues. *Surgery* 12:81 (July) 1942.

4. Schamp, J. R., Experimental Studies on the Toxicity of Procaine. *J. D. Res.* 20:425 (Oct.) 1941.

5. Graubard, D. J.; Robertazzi, R. W., and Peterson, M. C., Intravenous Procaine: A Preliminary Report. *New York State J. Med.* 47:2187 (Oct. 15) 1947.

6. Burstein, C., Treatment of Acute Arrythmias During Anesthesia by Intravenous Procaine. *Anesthesiology* 7:113 (March) 1946.

thetized patients with cardiac arrhythmias during intrathoracic surgery. No untoward effects were observed and the arrhythmias often improved. General anesthesia, says Burstein,[6] "probably affords specific protection against the stimulating action of procaine on the central nervous system."

Concerning idiosyncrasy, Goodman and Gilman[7] state that it is rare, but that deaths have been reported from the injection of 10 to 30 mg. of procaine hydrochloride. "The cause of death is usually credited to cardiovascular collapse and occurs immediately."[7] It is interesting to compare this statement with that of Graubard, Robertazzi and Peterson[5] who report 2,000 intravenous infusions without evidence of procaine sensitivity or other contraindications.

In dental practice 2 per cent solution of procaine hydrochloride commonly is used. A 2 cc. carpule contains 40 mg. of procaine hydrochloride. If this quantity were inadvertently administered intravenously, as by accidental injection into the inferior alveolar vein, a blood level would be established in a 70 Kg. man of 1 mg. per kilogram as against 14 mg. per kilogram as used by Graubard, Robertazzi and Peterson.[5]

From the foregoing it is apparent that we should be able to revise our concept of the dangers inherent in the injection of procaine hydrochloride in the amounts customarily employed by dentists.

■ *Toxicity of Adjuvants*

Procaine, however, rarely is administered in the pure form. Along with preservatives and buffers, epinephrine, phenylephrine hydrochloride, ephedrine or nordefrin hydrochloride usually are included as adjuvants to potentiate the action of the procaine. Most commonly in dental surgery a 1:50,000 concentration of epinephrine is used with the procaine solution. The epinephrine acts as a vasoconstrictor, imposing a greater load upon the myocardium. In the case of severe coronary disease with infarcted myocardial areas this could result in cardiac failure.

Levine, Ernstene and Jacobson[8] have shown that 1 cc. of 1:1,000 epinephrine administered subcutaneously frequently precipitates attacks in patients with angina pectoris. There is disagreement as to the possible damage to a debilitated heart which can result from the vasoconstrictor effects of 2 cc. of 1:50,000 concentration of epinephrine. Even this small quantity administered intravenously will cause a rise in blood pressure and pulse pressure with a resultant increased burden on the heart. This effect, while of no consequence to the normal patient, may prove embarrassing to the diseased myocardium of a patient suffering from coronary artery insufficiency.

■ *Psychologic Factors*

It is a common observation that occasionally a patient obviously in the best of health may show signs of vertigo or may actually go into syncope following the injection of procaine hydrochloride and epinephrine. Syncope was very common among scores of healthy servicemen who would succumb following routine inocu-

7. Goodman, Louis, and Gilman, Alfred, *The Pharmacological Basis of Therapeutics*. New York: The Macmillan Company, 1941.

8. Levine, S. A.; Ernstene, A. C., and Jacobson, B. M., The Use of Epinephrine as a Diagnostic Test for Angina Pectoris. *Arch. Int. Med.* 45:191 (Feb.) 1930.

lations and venipuncture. All cases of dizziness and syncope following injections of procaine hydrochloride and epinephrine cannot be ascribed to pharmacologic effects. Other factors to be considered are the mental attitude of the patient in his possibly unpleasant surroundings as well as the confidence inspired by the doctor.

■ *Summary and Conclusions*

1. Procaine hydrochloride in amounts routinely used by dentists probably is harmless even if injected intravenously.

2. Epinephrine, when used with procaine, will cause vasoconstrictor effects with possible serious results in patients suffering from cardiac disease.

3. Vertigo and syncope following injections are often due to the psychologic attitude of the patient.—*510 Madison Avenue.*

A conservative technic for the management of a common type of impacted mandibular third molar

■ *Irvin V. Uhler, D.D.S., Lancaster, Pa.*

"Third molars are decadent teeth which may eventually be entirely lost."[1] "Perhaps in a hundred thousand years or so, they will disappear altogether."[2] This, indeed, may be the plan of the Infinite, but for the twentieth century practitioner these malpositioned, often imperfectly developed teeth, present a very real problem. Volumes have been written classifying the impacted mandibular third molar, and more volumes have been dedicated to its removal. The gross amount of the literature on the subject is mute testimony to the importance of proper evaluation of these impaction problems, and to the necessity for a carefully planned procedure dedicated to a satisfactory solution for both patient and operator. The purpose of this paper is to take the general practitioner over the various steps of removal of a type of mandibular third molar impaction frequently encountered in daily practice. It is not intended as a universal procedure in the approach to this entity. It is limited to one type of impaction and uneruption which is increasing in incidence; the vertical type, lying just beneath the crest of the alveolar ridge and in many instances protruding slightly through it. With a carefully planned, intelligent approach, this impaction problem lies within the abilities of general practitioners who have a fondness for exodontia of a minor nature. It is, however, a serious undertaking filled with complete responsibility

1. Gregory, Wm. K., *The Origin and Evolution of the Human Dentition.* Baltimore: Williams and Wilkins Co., 1922.
2. Romer, A. S., *Man and the Vertebrates.* Chicago: University of Chicago Press, 1933.

for the operator, and not a procedure to be carried out between appointments.

■ *Roentgenographic Examination*

When the existence of an uncomplicated vertical impaction is established, accurate roentgenograms should be made. These must reveal the tooth in its entirety, and a fair amount of its immediate environment in all directions. This may require, in addition to the usual intraoral films, several occlusal plane exposures and extraoral views.

The extra time invested in careful exposures from varying angles will return uncountable dividends at operation time, as will care in study of the processed roentgenograms. Too frequently, after a difficult removal, a postoperative magnification of the films will reveal an exostosed root, or a curved root which the operator overlooked. Preoperative appraisal of these conditions would have altered the operative technic, lessened the surgical trauma and shortened the convalescence period.

■ *Operative Procedure*

The operation must be thoroughly planned. Every step, from the initial incision to the tying of the final suture, must be visualized clearly. For with even the most meticulous preoperative evaluation of the problem presented, situations will arise requiring modification or alteration of the procedure for which the operator must be prepared.

EXPOSURE OF THE OPERATIVE SITE—The flap reflection suggested by Dingman and Hayward[3] is one which gives an excellent view of the operative field, results in a minimum of tissue damage and prevents the troublesome hemorrhage frequently accompanying the vertical type of incision which extends one-half inch or more distally from the second molar up the anterior border of the ascending ramus. Too often this incision severs a small artery in the medial aspect of the masseter muscle with a resultant heavy flow of blood into the operative site which is difficult to control. With the flap reflection no incision is made mesially from the field down into the muccobuccal fold, as this area is very slow in healing and frequently remains open long after the operative site has healed.

The preferable type of flap is accomplished in the following manner. The interproximal septa are cut from the second molar to the first bicuspid. An incision is made from the distolingual aspect of the second molar and carried at an angle of 45 degrees toward the cheek (Fig. 1, *A* and *B*). The mucoperiosteum around the distal and buccal surfaces of the second molar and the buccal surface of the first molar and second bicuspid is raised with a periosteal elevator, and is reflected buccally (Fig. 2, *A*). If the tissue will not retract sufficiently to denude the operative site, one or two more septa to the mesial are cut. This extension is rarely necessary, but may be indicated to attain good visual access in the case of a short thick mandible. As the site is exposed, it is not uncommon to encounter tenacious adhesions, especially over the crown of a tooth where just one or two cusps are faintly erupted. These adhesions must be completely severed or they will

3. Dingman, Reed O., and Hayward, James R., Oral Surgery in General Practice. *J.A.D.A.* 35:607 (Nov.) 1947.

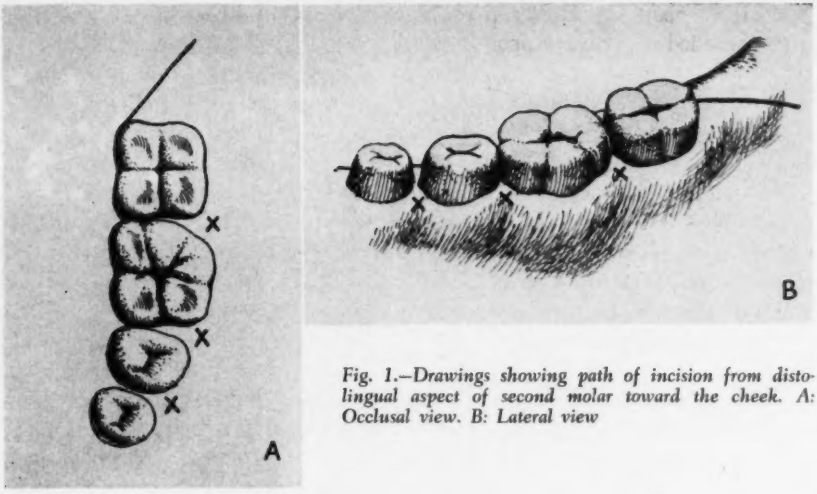


Fig. 1.—Drawings showing path of incision from disto-lingual aspect of second molar toward the cheek. A: Occlusal view. B: Lateral view

bar good visualization of the operative site. This is done by scalpel or scissors dissection, while retracting the flap with a periosteal elevator held in the free hand. Throughout the operation the flap is retracted with this instrument which also acts as protection against accidental instrumentation of the flap. There is no excuse for further contact with this flap until the wound is ready for closure, and any abuse of it is mismanagement.

CONTROL OF HEMORRHAGE—With the field adequately exposed, suction apparatus is used by the assistant. Although a minimum of hemorrhage accompanies this type of flap, suction is necessary to keep down accumulations of saliva, blood and operative debris which normally accompany the operation. In some cases, failure may result from poor vision due to an improperly cleared field.

EXPOSURE OF THE TOOTH—The next step is exposure of the crown of the impacted tooth. By the use of bone burs or bone chisels, the bone overlying the coronal portion of the tooth is removed on the buccal and occlusal aspects (Fig. 2, *B* and *C*). On the alveolar crest it is well to stay as far buccally as possible. Frequently the lingual nerve is overlying the lingual surface of the crown, and may be severed. With good buccal exposure there rarely is need for much exposure of the lingual third of the occlusal aspect.

SECTIONING THE TOOTH—When the crown is well exposed, it is desirable to identify the buccal groove, if present, and the occlusal anatomy of the tooth. One or both of these landmarks present an excellent site for sectioning of the tooth. By sectioning it is possible to simplify an otherwise formidable operation. If these grooves are indefinite in character, they may be accentuated by the use of small cross cut fissure burs or diamond drills

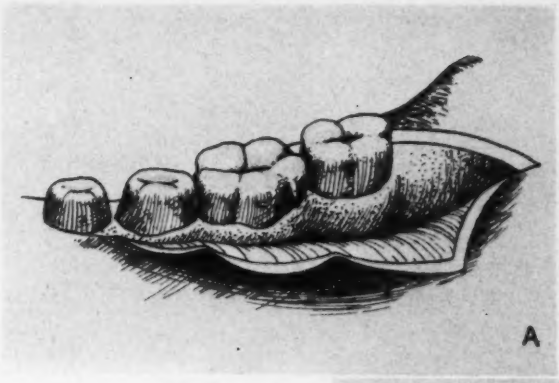
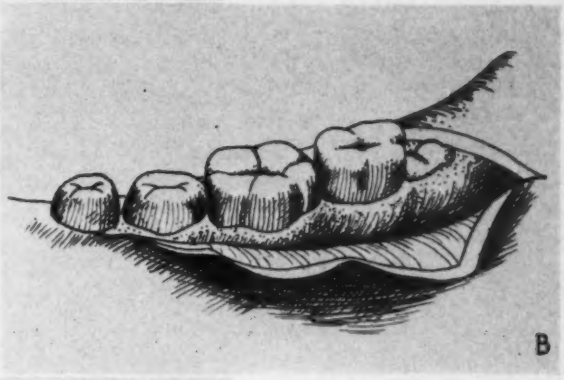
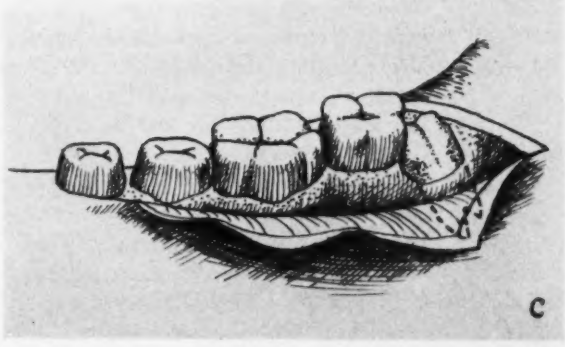


Fig. 2.—A: The mucoperiosteum around the distal and buccal surface of the first molar and second bicuspid is raised with a periosteal elevator, and is reflected buccally



B: The next step is exposure of the crown of the impacted tooth. By the use of bone burs or bone chisels, the bone overlying the coronal portion of the tooth is removed on the occlusal aspect



C: Drawing showing buccal surface of the impacted tooth exposed. With good buccal exposure there rarely is need for much exposure of the lingual third of the occlusal aspect

until their depth is sufficient for the reception of the cutting edge of a splitting chisel. A sharp chisel is introduced into the groove of choice, and a sharp clean blow is struck with a mallet along the long axis of the tooth. It is imperative that

Fig. 3.—Roentgenograms made after sectioning the tooth will reveal the simpler portion to be removed first. The second portion is then elevated into the vacated space and delivered

the blow follows the long axis, for a blow in a lingual direction may sever a long triangular fragment of bone from the lingual aspect, traumatize the tissues and tear the lingual nerve.

It is well to point out that this technic is limited to fully calcified molars in the adult. A crown with incomplete or uncalcified roots will be driven deeper into the tissues, and will be troublesome to recover. A properly executed blow in most instances will split the tooth into two sections. If the tooth fails to split, a dull chisel or an improper mallet blow should be suspected. If these factors are ruled out, an unusually dense tooth may be found to be the causative factor. In this case, the grooves are deepened, and the blow repeated.

Assuming that the tooth has been sectioned, an elevator is applied to deliver the simpler portion. A roentgenogram will be the guide in this selection (Fig. 3). The second portion is then elevated into the vacated space and delivered. Failure of the tooth to split ideally is no indication of failure, and any fragment sectioned should be considered a step in the solution of the problem. If only the distal portion of the crown comes away leaving the root structure intact, it is comparatively easy to separate the roots with a bur or chisel, and then proceed as in the ideal split. Frequently only the distobuccal quarter of the crown will fracture away; this is still a help, and the procedure is continued as outlined.

Following each mallet blow it is imperative to note carefully whether the tooth has been loosened in its bony cavity. If the tooth shows movement, the mallet and chisel are laid aside, for this force is contraindicated on a loosened tooth. On a loosened tooth, deepen the grooves with burs until the tooth can be split with an elevator. This practice is also applicable where, after sectioning, an elevator cannot be engaged to remove the halves. Drill an opening into the root, just beneath the crown, suitable for the reception of an elevating instrument.

All of these steps have a single objective: to make a simple removal out of a normally complex operation. Thoma[4] has stated: "It is better to injure the tooth to be removed than to cut away a great deal of the tissue that later has to be replaced by repair." In some instances a tooth will present an overly large crown

4. Thoma, K. H., The Management of the Malposed Inferior Third Molar. *J. D. Res.* 12:175 (Feb.) 1932.

which will not elevate easily through the flap exposure. Rather than exert force to stretch the flap, or cut it wider, it is a better procedure to grasp the tooth with a large hemostat and attempt to rotate it through the opening. If this is not practicable, it is better to reseat the tooth, or fragment, and drill a slot at the cementoenamel junction for the reception of an elevator with which to fracture off the crown. This will accomplish removal with no further trauma to the tissues. Many operators pride themselves on their ability to deliver a tooth in its entirety. This can only mean more trauma, a larger wound and a longer convalescence. There is, also, much greater risk of mandibular fracture. These factors condemn the practice.

Gardner[5] states, "The fact should not be overlooked that every time a lever of any kind is used, the fulcrum is more or less injured. Moreover, when an instrument is forced between the tooth and the bone, the bone is compressed by the wedging effect, which causes marked trauma in many cases. Additional trauma is also produced by forcing the tooth, whole or in part, to enlarge its own socket. For example, when a tooth is grasped with the forceps and pressure is exerted for removal, the root becomes an additional instrument. The same is true when an elevator is applied, as the lifting of the crown forces the root to enlarge its socket." In the steps outlined, these undesirable end results are not risked if the operator applies the principles stressed. Trauma, too, is kept to a minimum with a resultant smoothing of the postoperative road.

After removal of the tooth, the site is examined and palpated carefully for sharp bony prominences. These are smoothed with bone files or antrum burs. The length of the flap is examined carefully for loose particles of tooth and bone structure. The region of the bony cavity which was occupied by the crown is checked carefully for retained epithelial elements. These may be removed either by scalpel dissection or rongeur forcep instrumentation. The operative site may be frosted lightly with a powder of 50 per cent penicillin, 25 per cent sulfanilamide and 25 per cent sulfathiazole. If a good blood clot is organizing, the bony cavity is not too large and no pus is present, no dressing is necessary. The mucous flaps are merely sutured together. If the blood clot seems inadequate, or if the bony cavity is too large, or is infected, a small dressing of iodoform gauze is inserted. If extreme pain is anticipated, the gauze may be saturated with an obtundent drug. There is no substitute for a firm healthy blood clot, and any other occupant than this in the socket constitutes a foreign body. After the insertion of the drain, the flaps are sutured.

■ *Comment*

Years of use by many operators have proved the merits of this technic. It is within the realm of the general practitioner, and will serve him well as an intelligent approach to this type of surgical problem.—548 *North Duke Street.*

5. Gardner, B. S., The Impacted Mandibular Third Molar. *J.A.D.A.* 20:1030 (June) 1933.

The periapical abscess

■ *J. Roy Bourgoyne,* D.D.S., and James H. Quinn,† D.D.S., Memphis, Tenn.*

Many terms are used to denote the condition commonly known as the periapical abscess, some of which are: alveolar abscess, dentoalveolar abscess, apical abscess, dental abscess and, in many instances, simply abscess. It seems to us that the term periapical abscess suits the condition, therefore, it is so termed in this article.

The simple condition, abscess, may be defined as a localized reservoir of pus brought about by the disintegration of tissues in the living body. Grossman[1] defines the dentoalveolar abscess as a collection of pus at the apex of the root of a tooth with extension of infection through the apical foramen into the surrounding tissues, accompanied at times by severe local or general reactions. Hyde[2] simply defines it as a localized form of osteomyelitis which might spread beyond its confines.

Many definitions could be given here; however, it is felt that they would only detract from the interest of the material. It is desired only that the subject be recognized.

Some etiologic factors concerning the periapical abscess are trauma, chemical and mechanical irritations and bacterial invasions. Those caused by trauma are usually the result of an isolated tooth bearing excess stress of mastication or of a high restoration causing the tooth in question to meet the teeth of the opposite arch first. In this manner the periapical tissues are pounded excessively. Trauma resulting from a blow to the teeth may cause an abscess. Such incidents injure the vessels and nerve at the apical foramen, thus causing death to the tooth by separation from its supply of nutrition. Trauma may also be caused by holding articles between the teeth. These dangerous articles may be pencils, pipe stems, hair pins, bobby pins, cigaret holders and ice, all of which may stimulate the formation of an abscess.

Death of the pulp may be caused by the action of chemicals from various cements on the nerve. In such cases it is supposed that the cement is placed in contact with the pulp chamber. The acid in silicate restorations commonly is found to be the cause of pulp death of anterior teeth.

The most common cause of the periapical abscess is carious exposure. This may happen from neglected or poorly treated teeth. Bacterial invasion of the pulp results, bringing about an abscess at the apex of the root which may develop to any depth of severity. Bacterial infec-

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1. Grossman, Louis I., *Root Canal Therapy*, ed. 2. Philadelphia: Lea & Febiger, 1946.

2. Hyde, W. H., and Shlefstein, I. H. L., Hot on the Inside and Cold on the Outside—The Acute Alveolar Abscess. *Dental Outlook* 29:158 (Apr.) 1942.

tion may also be hematogenous in action, gaining entrance to the pulp tissue through the nutrient vessels. Abscesses occurring in this manner may be difficult to diagnose until a complete blood picture is taken.

When the pulp becomes infected it first throws off gas, and then pus through the apex of the root; the pus, in turn, resolves itself into an abscess. If this process of exudation is slow enough there will be little or no pain, but if the process is rapid, there will be extreme pressure on the bone at the root end, causing excruciating pain. The bone will begin to resorb or give way to the pressure of the pus formation and a rarefied region around the root end will result. The pressure will always take the course of least resistance. Therefore, if the tooth is deciduous the pus will usually travel out of the apical end and follow the margin of the root back toward the surface of the gingiva. When the gingival margin is reached, the attachment of the gingiva to the neck of the tooth gives greater resistance in the path of the pus. It will stop there for several hours, and then finally break its way through and travel toward the buccal gingiva (Fig. 1). For this reason, abscesses from deciduous teeth are usually less severe and are found on the buccogingival tissue instead of deep in the musculature.

Abscesses resulting from caries of the permanent teeth take a different action of progression in their formation, and cause more profound pain. The greater degree of pain is due to the more firm and permanent attachment around the roots of the teeth. The pus and diseased material being formed in the inflamed pulp chamber and root canals find their way through

Fig. 1.—Drawing showing periapical abscess. When the tooth is deciduous the pus will usually travel out the apical end and follow the margin of the root back toward the surface of the gingiva

the only opening, which is the apex of the root; pressure is brought to bear against that region including the nerves and vessels. This pressure, exerted over a period of time, tends to rarefy the bone. Through the small openings in the rarefied bone, the pus finds its way into the surrounding tissue where it diffuses through the tissue cells, expanding and stretching them in the process, causing excruciating pain. Finally this tissue breaks down, forming a reservoir for the accumulating pus.

When the processes involved in the formation of typical alveolar abscesses are understood, the forms and methods of treatment are better understood.

■ *Diagnosis*

The theory concerning the formation of an alveolar or periapical abscess is important from every viewpoint; however,

correct interpretation of the signs and symptoms should be viewed with utmost care. As a rule, the abscess does not produce a difficult problem in diagnosis, especially in the acute stage of the disease.

Hypersensitivity to touch is among the first of the symptoms noticed. In the early stages this slight pain may be relieved by constant pressure produced by the patient clenching his teeth tightly together. The pain progressively increases in severity and a piercing pulsating pain develops which may increase when the patient is lying down or places his head below or at the level of his body. This is due to increased blood pressure to the region. Because of increased pressure and distorted occlusion, it seems that other teeth begin to ache.

The next symptom to appear is that sensation of elongation of the tooth itself. The periodontal membrane becomes thickened and swollen, slightly raising the tooth from the socket. Even this is enough to be detected by a tender tooth striking first in occlusion. Because of this the tooth becomes so tender and painful that the patient must refrain from eating. The tooth actually extrudes enough from the socket to be detected visibly. At this stage the electric vitality tester shows little or no reaction.

After these symptoms have presented themselves, the signs begin their presentation. The gingiva becomes swollen, discolored and tender to pressure. Often a white film will be found on the gingiva around the tooth in question. This is due to the lack of the self cleansing mechanical setup whereby food is chewed and forced over the tissues with pressure, displacing the food that has gone before it. The edematous tissue usually will be found on the labial and buccal surfaces because this is the direction of the path of least resistance. At times, but less often, the soft tissues on the lingual or palatal side will become involved.

As the untreated abscess continues on its course, regional lymph node involvement occurs. The nodes are prominent and tender to touch, which shows that the body defense is active in fighting the infection but is fast losing ground. In the later stages breakdown of the surrounding apical tissues is evidenced by roentgenograms. Pus is given off from the pulp chamber so rapidly that the defense mechanisms cannot cope with the situation. A vast amount of pressure is exerted, forcing the bone to give way as it is devoured by suppuration, and the tooth begins to loosen. As the suppurative process continues in the bone, pressure increases, producing greater pain.

After several days of severe activity, the pus succeeds in passing through the bone into the soft tissues where it undermines the periosteum, then passes into the tissue spaces around the jaw. At this time fluctuation appears allowing the tissue, usually in the center of the swelling, to give way easily to pressure.

Upon reaching this stage the portion of the face closely associated with the affected tooth is usually swollen. This swelling is not necessarily produced by the direct action of bacteria but can be produced by infiltration of their toxins causing a great amount of irritation. After reaching the stage of fluctuation, if left untreated, pointing will occur producing large areas of scar tissue. If pointing does not occur, the area of fluctuation in-

creases, producing widespread cellulitis. Further refusal of treatment may result in active osteomyelitis with loss of any or all bone in the region.

The x-ray has been of great value in the differential diagnosis of abscesses, but it must not be depended upon as the only method. Bone must be lost to some extent before the x-ray is of value in diagnosis. There may be little or no bone involvement and yet severe infection may exist, or the opposite may be true. The so-called textbook picture shows a rather large region with a loss of trabeculae and an indefinite outline. The location may vary from that directly on the apex of the involved tooth to a rather remote position deep in the alveolar process or it may even be located on the side of the root or roots.

The general symptoms of the patient, of course, are those of infection. The temperature may be that of constant elevation, ranging from 100 F. to 105 F., or it may appear as the septic type, first with elevation, then a chill; this is a sign of great danger.

There is a high rise in the white cell count, in some cases up to 20,000 with 80 to 85 per cent neutrophils predominating. There is a general feeling of discomfort.

■ *Treatment*

The subject of the treatment of abscesses has been discussed and debated for years, and yet few experiments have been done to establish a conclusive justification of ideas or a standard form of treatment. The most prominent questions in the minds of many are: (1) Should hot or cold compresses be used on the jaw? (2) When should they be used? (3) Should the pulp chamber be opened now, later, or not at all? (4) When should the involved tooth be extracted?

Those who advocate the cold treatment base their theory on the fact that cold will contract the tissues and keep the abscess from localizing extraorally. The theory utilizing heat maintains that the heat opens the tissues, establishing better drainage through channels which nature has provided for this purpose, and a localized artificial fever is developed to combat the organisms.

There is a minor surgical procedure which we have found useful and effective during the time heat therapy is being administered. The procedure is as follows: A three-cornered flap is made on the buccal surface of the abscessed tooth and the flap removed (Fig. 2, left). The buccal plate of bone is then removed from this area to the depth of the root tips, not disturbing the apexes, but giving vent to the drainage of pus from the spongy bone. In many cases this relieves the acute symptoms and affords some relief to the patient until the chronic stage of the abscess is reached.

In studying the bacteriologic cultures of 300 patients whose abscesses had been incised and drained both intraorally and extraorally, we found that the predominating organism was Staphylococcus aureus. This coincides with the bacteriologic observations presented in the work of other investigators who have taken cultures from these conditions over a long period of time.

When the condition is still in the early stage and the tooth is causing a great deal of pain, the discomfort may be alleviated by opening the pulp chamber

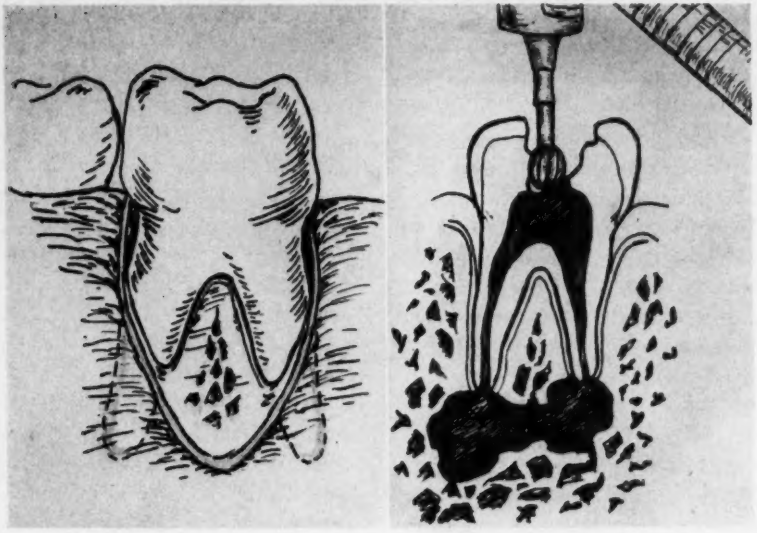

Fig. 2.—Left: Drawing showing surgical procedure which is useful during time heat therapy is being administered. A three-cornered flap is made on the buccal surface of the abscessed tooth and the flap removed. The buccal plate of bone is removed to the depth of the root tips, not disturbing the apexes, but draining the spongy bone. Right: Pain may be alleviated by opening the pulp chamber from the crown, thereby relieving the pressure

from the crown, thereby relieving the pressure (Fig. 2, right). This treatment is successful because in the early stages the pressure and resultant pain are caused mostly by gas formation. This particular treatment will, however, be of no use in well established cases where the infection has reached the soft tissue. The pus in this region is unable to effect a backward flow through the opening in the bone and root canal. Intraorally an area may be incised and drained as soon as a definite raised area, soft to palpation, presents itself. Extraorally, incision and drainage should be done at the time of the appearance of a definite soft spot in the tissues. This should not be delayed longer. If the incision and drainage is done at this time, much of the pain will be removed, and the patient will be spared a great deal of scar tissue that will develop otherwise.

Recently much has been written concerning antibiotics and chemotherapy, and not without justification.[3, 4, 5, 6] Therefore while on the subject of abscesses, some of these miraculous drugs will be discussed.

3. Buchanan, John C., Oral Abscesses and Granulomas. *D. Cosmos* 72:605 (June) 1930.

4. Cook, Bruce B., Management of Early Acute Dento-Alveolar Infections. *J.O.S.* 2:128 (Apr.) 1944.

5. Feldman, M. Hillel, Essential Problems in Exodontia. *D. Items Interest* 66:1043 (Nov.) 1944.

6. Kolmer, John A., Relation of Chemotherapy to Dentistry and Oral Surgery With Special Reference to Antibiotic Compounds. *J.A.D.A.* 35:12 (July 1) 1947.

Great strides have been made in recent years in the field of therapeutics by the discovery of various agents which serve as powerful weapons for the healing arts in their struggle against diseases. The most heralded of these drugs perhaps are the sulfonamides and the antibiotics. In the realm of oral surgery, drugs including these and others have earned a definite and prominent place. It should be borne in mind that the use of these agents does not obviate the need for surgical treatment, but in most cases the drugs serve as valuable adjuncts in the course of treatment.

Penicillin and the sulfonamide drugs exert a specific and/or selective effect on some metabolic or proliferative phases of pathogenic organisms without serious detrimental results to their living host. This selective action which is not too well understood varies with the compounds employed, and their action may be bacteriostatic or bactericidal depending on the chemical makeup of the drugs, nature of the agent of disease and environmental factors present.

These drugs are specific for all gram-positive organisms and some of the most important gram-negative bacteria. It is fortunate that the majority of dental infections are due to forms of streptococci, staphylococci, pneumococci, Neisseria catarrhalis and various spirochetes, all of which are susceptible to attack. The chemotherapeutic agents are more effective against micrococci than bacilli, and their effect on Rickettsia, viruses and fungi is small.

THE SULFONAMIDES—The sulfonamides are a group of chemical compounds, dye derivatives, which in common contain the chemical group—SO_2N. The most familiar members of this group are sulfadiazine, sulfaguanidine, sulfamerazine, sulfanilamide, sulfapyrazine, sulfapyridine, sulfathiazole and succinylsulfathiazole. Their action is mainly bacteriostatic, but when applied topically, in large quantities, they exert a bactericidal action. The exact mode of action of the sulfonamides is not known, but evidence from experimental work indicates that these drugs interfere with certain of the enzyme systems necessary for the growth and reproduction of bacteria.

There are certain chemical compounds which play a part in the growth metabolism of bacteria and which have an antagonistic effect on the sulfonamide drugs. An example of these is para-aminobenzoic acid which is widely distributed in nature. Of special importance in this regard is the fact that procaine, so widely used in dentistry, is an ester of para-aminobenzoic acid and when injected into the tissues breaks down into the parent substance; hence procaine nullifies the action of the sulfonamides.

Some of the other local anesthetics which have para-aminobenzoic acid as part of their structure are butacaine, methanesulfonate, "Larocaine" and tetracaine. Cocaine, piperocaine and dibucaine are not para-aminobenzoic acid derivatives. It has been observed that urea tends to decrease the effect of para-aminobenzoic acid, hence the sulfonamides and urea are administered together, but the use of urea in a wound should be discontinued after the formation of granulation tissue, as it tends to inhibit the growth of epithelium.

In the body the sulfonamides perme-

ate all the tissue, even diffusing rapidly through the placenta. The drug can be administered orally in tablet form, by injection, or it can be used topically as a dusting powder or incorporated into an ointment. When given orally, absorption from the stomach is negligible, but rapid from the intestines. Laboratory studies indicate that the sulfonamides may be bound to plasma protein in the body. This tie-up is not an inactivation of the drug but rather it is slowly released to the tissues, producing its effect.

Sulfonamide compounds are excreted through the kidneys with traces present in the saliva and perspiration. The drug is conjugated and acetylated, probably in the liver, and excreted in the urine in the acetylated form (the acetylated drug is ineffective). When the urine is alkaline, the sulfonamide is held in solution. However, acid urine precipitates the drug, both the free and acetylated form, in the tubules of the kidneys. This leads to obstruction resulting in anuria with uremia. hematuria and renal injury. Since the pH of urine normally is acid, 0.5 to 1.0 Gm. of sodium bicarbonate is administered with each gram of the sulfonamide drug used. Sulfathiazole, sulfamerazine and sulfanilamide are absorbed rapidly with a high blood level obtained in two to three hours after administration. However, sulfathiazole and sulfanilamide are also excreted at a rapid rate while sulfamerazine is excreted much more slowly, maintaining the blood level longer and permitting a greater interval of time between doses.

In order of effectiveness, sulfathiazole is first; sulfadiazine and sulfamerazine rank close together as second and third; sulfapyridine, fourth; and sulfanilamide, fifth. In tissue infections caused by organisms found in the mouth, sulfathiazole, sulfadiazine, sulfanilamide and sulfapyridine are equally effective. The usual oral dose for these drugs is 4 Gm. initially followed by 1 Gm. every four hours. For local use, sulfanilamide, sulfathiazole and sulfadiazine commonly are employed; sulfanilamide is the most soluble and least irritating of the three, sulfadiazine is the least soluble, and sulfathiazole is a specific for staphylococci infections. One disadvantage of sulfathiazole is that it cakes and forms crusts in wounds. For superficial open infections caused by hemolytic streptococci, the use of sulfanilamide is best. The powder or crystals may be sprayed on the exposed bony areas and under the mucosa where a flap has been turned. Since the presence of pus and necrotic tissue debris inhibits the action of the sulfonamide drugs, the area should be cleansed prior to the application of the drugs. All of these drugs should be sterilized before using.

Powders and pastes in large quantities are not only ineffective, but may act as irritants and delay healing, giving a foreign body reaction, and producting a possible sensitization of the drug to the patient. Although the sodium salts of the sulfonamides are more soluble, they have a pH of 9 to 11, and cause tissue necrosis and sloughing of tissue. For this reason, they are not used.

Aside from their many benefits the sulfonamide drugs may also produce toxic effects and if administered over a long period of time are potentially dangerous. These toxic reactions may be (1) headache, vomiting or dizziness; (2) the de-

velopment of a hyper-sensitivity; (3) toxic effects on kidneys, urinary tract, and blood cellular elements. The sulfonamides are contraindicated if there is a history of hypersensitivity, and should be employed with great caution in conditions of renal deficiencies and blood dyscrasias. Any patient may tolerate the initial course of administration of these drugs, but when used again, he may have a severe toxic reaction. Although the exact nature of this reaction is not understood, it is felt that an allergic type reaction produced by the acquired sensitivity develops from the absorption of even minute amounts of the drug, changing homologous proteins into allergens. The sulfonamides should not be used indiscriminately as sensitization, developing when the drugs are used for a minor ailment, may preclude their further value when a major illness arises. Sulfadiazine is less toxic than sulfanilamide, and sulfamerazine, sulfapyridine, sulfathiazole and sulfapyrazine are the least toxic.

Administration of sulfonamides is indicated in oral surgery in cases of removal of cysts of the jaws, dry sockets, complete alveolectomy, removal of upper impacted teeth, cellulitis following extraction or surgical procedure, oral infections of dental origin. The drugs are used as prophylactic agents preoperatively in cases of old healed rheumatic cardiovascular lesions, congenital cardiac defects and other diseases which may be activated by removal of infected teeth.

PENICILLIN—Penicillin is an antibiotic substance which is derived from certain species of molds belonging to the genus Penicillium, by extraction of cultures, grown on special media. This substance exists in several forms, those isolated at present being designated as F, G, K and X. Amorphous and crystalline mixtures have been produced in the form of calcium and sodium salts. The noncrystalline salts require refrigeration in the dry state and in solution in order to preserve their potency, while the crystalline form is stable in the dry state without refrigeration for a period of three years. However, in solutions, buffered to a pH of 6.0 or more, refrigeration is required, and the potency is maintained for a minimum of seven days. Tablets should be kept in tightly closed containers to prevent deterioration from moisture. Free penicillin exists in the form of an organic acid and reacts to form various salts and esters. When treated with alkalies, dilute acids, primary alcohols, oxidizing agents and heavy metals and when in solutions having a pH of more than 7 and less than 5, it is very unstable.

The action of penicillin is both bacteriostatic and bactericidal, and it is useful against all gram-positive organisms and some gram-negative bacteria. It is most effective in infections caused by staphylococci, hemolytic and anaerobic streptococci, clostridia, pneumococci, gonococci, meningococci, early and late syphilis, actinomycosis and the organisms causing Vincent's infection. The drug may be administered orally, parenterally, by inhalation or topically. Its action is not inhibited by the presence of pus, tissue products or para-aminobenzoic acid, as are the sulfonamides. Whole blood and serum do not affect its activity, and it does not interfere with leukocytic activity or with the growth and migration of lymphocytes,

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fibroblasts or macrophages. The theory of penicillin action is that it inhibits the enzyme–SH groups of the bacteria, and by this binding of the protein grouping, growth of the organism is prevented; the organism becomes inactivated and can eventually be phagocytized by the white cells of the blood.

In the body penicillin is absorbed rapidly and gives a high initial blood concentration with a gradual fall. After two to three hours only a trace remains in the circulation. No penicillin is found in the tears, saliva or cerebrospinal fluid. In the digestive tract, the drug is partially inactivated because of the gastric acid, and absorption is poor. For this reason buffers must be used with the drug when administered orally, and the dose is usually four or five times greater than that given by injection. The changes the drug undergoes in the body are not fully understood, but 40 to 60 per cent of the unchanged product is excreted rapidly in the urine. Penicillin is practically nontoxic, and though delayed urticarial reactions have occurred at times from its systemic use, it is considered one of the safest drugs available. Mixtures of beeswax and peanut oil have been employed as vehicles for giving a more prolonged action of penicillin. Absorption is delayed and penicillin is liberated slowly and continuously. Penicillin is not inactivated or destroyed when added to 0.5 per cent solutions of procaine, piperocaine and butethamine. The usual dose of penicillin for treatment of severe infections in adults is the intramuscular injection of 40,000 units every three hours to maintain effective blood levels. Intramuscular injections of 300,000 units in oil or beeswax every 24 hours, however, is rapidly becoming the most popular method. For minor infections oral tablets of 100,000 units each are administered, two tablets at the initial dose and one tablet every four hours, day and night.

When used topically, penicillin is more potent and less irritating and is noninjurious to tissues, organs and blood elements. Its use in this manner is somewhat more difficult because of its transitory effect, and it must be applied continuously. The usual method is the application of 10,000 units in solution on sterile gauze inserted in the socket, with infiltration in the area and intramuscular injections of 10,000 units as adjuncts. This mode of treatment is useful for infected sockets, dry sockets, and sockets which are painful from tissue and bone traumatization. Penicillin ointment has been used with success in postoperative infection of the alveolus. Two treatments usually suffice to control suppuration and aid healing. The ointment contains 1,000 units of calcium penicillin in 1 Gm. of ointment, the base being composed of wool fat, petrolatum, wax and cottonseed oil. Usually 1 Gm. is used at a time and this is packed in the débrided alveolus with a sterile applicator. Such a method serves as a medium for the continuous liberation of penicillin with controlled absorption.

In oral surgery, penicillin is of value in circumcoronal infections; in localized infections with chronic suppuration; in cellulitis; in oral infections of dental origin; for preventing extension of infection in acute alveolar abscess; for preventing bacteremia or septicemia after surgical procedure for osteomyelitis; for preventing septic osteitis in extractions of lower third

molars which were impacted, imbedded, or only partially erupted; for preventing infection after gingivectomy in treatment of severe cases of periodontoclasia; for preoperative prophylaxis. For the last purpose 40,000 units are given intramuscularly half an hour before the operation is performed, and it is indicated in cases of valvular and congenital heart defects. Penicillin is synergistic with the sulfonamides, and the two can be used in combination by any of the methods for administering either drug. This combined action is especially useful in polymicrobial infections where some of the organisms are susceptible to one drug and the rest to the other drug.

Recently there has appeared on the market a new drug, 4-carboxphenylmethanesulfonanilide ("Caronamide") which temporarily suppresses the tubular excretion of penicillin. By this action it is possible to elevate the penicillin plasma concentration from two to seven times, giving prolonged action of the antibiotic with reduction in frequency of administration. This is useful in conditions requiring high and sustained levels of the drug. The interval of administration of penicillin may remain the same as usual, but the dose may be reduced by one-fourth or one-half, since the increased penicillin plasma levels have averaged fourfold with the "Caronamide." The dosage of "Caronamide" for adults is 1.5 to 3.0 Gm. every three to four hours in conjunction with the penicillin. The "Caronamide" should not be administered at intervals greater than four hours.

On hospital admission of a severe abscess, these orders should be written on the patient's chart:

1. Hot magnesium sulfate compresses to the abscessed region constantly.
2. Hot saline mouth soaks for five minutes every half hour.
3. Potassium acetate, sodium bicarbonate and sodium citrate, 15 grains of each three times a day.
4. Diet as tolerated.
5. Sedation every three hours if necessary.
6. Force fluids.
7. Penicillin (in oil), 300,000 units daily.
8. Sulfadiazine, 15 grains every four hours.

TECHNIC FOR INCISION AND DRAINAGE —The incision and drainage is a simple procedure and the effects gratifying if correctly done. However, if there is a failure to establish and hold patent a path for drainage of sufficient size, the procedure will be a failure. For submaxillary abscesses the incision should be made along the lower border of the mandible in the shadow of the jaw so that visibility of the scar will be as slight as possible. The incision should be parallel with the lower border of the jaw and approximately 1½ inches in length, but only through the skin, no deeper. A pair of large hemostats or blunt Mayo scissors should be introduced in a closed position through the muscle fibers until the submaxillary space is reached and entered. The blades of the instrument are opened, parting the fibers and rupturing the pocket (Fig. 3, above). The scissors then should be removed in the opened position. The procedure is repeated several times, in different directions, until all pus pockets are broken up. A soft rubber tube, approximately 1 cm.

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in diameter, is fenestrated with a pair of curved scissors and inserted to the bottom of the pocket (Fig. 3, below). If the abscess is large, two or event three such drains may be inserted in different directions. These drains in the majority of cases should remain only 24 hours. If they are left in longer they will act as foreign bodies and may prolong the drainage and cause a large scar of the dimpling type. In some cases, it is necessary to suture the drain into position, but these sutures should be very loosely placed. Postoperative orders may be:

1. Sedative every four hours if necessary.
2. Hot magnesium sulfate compresses to involved region constantly during the day.
3. Hot saline solution mouth irrigation every half hour.
4. Diet as tolerated.
5. Force fluids by mouth.
6. Alkalizing agent.
7. Penicillin (in oil), 300,000 units daily.
8. Sulfadiazine, 15 grains every four hours.

The dressings should be changed every 12 hours, using aseptic technic, and the drain removed at the end of 24 hours. The hot compresses are continued until drainage ceases.

The incision and drainage is often a failure because even though the incision is deep, some pockets are left intact, or are not completely drained. Blunt dissection should be used after the skin is incised in order to avoid severing any of the important structures which lie deeper, such as the external maxillary artery, or branches of the facial nerve if the incision should be in that region.

If the abscess is large and tends to point extraorally, an intraoral incision, even though it is a deep one, is seldom successful because of the impossibility of getting complete drainage. This procedure has been tried many times in an effort to avoid an incision on the face, and in some cases osteomyelitis has been the final result.

TIME FOR EXTRACTION—Observations have been made that a number of dentists are overconscientious about extracting a tooth at the time of swelling. In our opinion it is true that this should not be done when the tooth is at its height of inflammation and soreness. This is the acute stage and should be treated with hot compresses until the sharp pain subsides to a lesser degree; this is usually from one to three days. As soon as the subacute stage is reached, the tooth should be extracted, regardless of the amount of swelling. If the tooth is allowed to remain longer, there is danger of complication by osteomyelitis. This unpleasant condition may develop as a result of the stasis of the pus in the reservoir and the concomitant constant drainage of pus from the tooth.

On the other hand, a number of dentists are overanxious to remove an acutely abscessed tooth in order to rid the mouth of its presence. This leaves the blood stream open to infection, and there may develop a septicemia recognized by alternating chills and fever; in some cases death is the final result. Therefore, it is important to be able to determine when and when not to remove an abscessed tooth. Sometimes no trouble will result

from removal of teeth in the acute stage, but there is a greater probability that it will.

A case history is presented which will exemplify a typical case of septicemia caused by the removal of an acutely infected molar tooth. This case occurred before penicillin was available.

History—A white man, aged 32, was brought to the hospital by ambulance in a semiconscious state. He was so violent that it was necessary for several people to hold him. The history given by his wife revealed that he had been awakened one night by a severe pain in the lower right side of his face; at this time he noted a swelling in that region. He went to his dentist who immediately extracted the tooth under local anesthesia, and sent the patient home. He suffered agonizing pain, but was assured that all would be well in time. His temperature was 104 F. when he reached the hospital two days after the extraction. He was confined to bed immediately, and he was given potassium acetate, sodium citrate and sodium bicarbonate, 15 grains of each. These drugs were given in an attempt to alkalize the patient systemically. A 1,000 cc. infusion of 10 per cent dextrose in saline solution containing 5 Gm. of sulfathiazole was administered. The patient regained consciousness the next morning. Hot compresses were applied extraorally. In the evening, he again became violent and lost control of his mental faculties. His temperature was 108 F. The entire right side

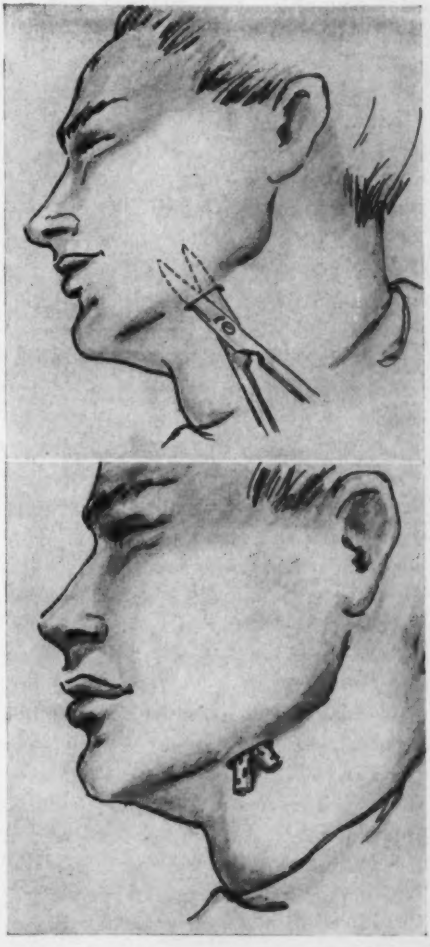

Fig. 3.—Above: Showing method of incision and drainage. Scissors are introduced in a closed position through the muscle fibers until the submaxillary space is reached and entered; open blades of the scissors, and remove in opened position. Below: A soft rubber tube, approximately 1 cm. in diameter, is fenestrated with a pair of curved scissors and inserted to the bottom of the pocket

of his face was swollen. The swelling extended into the postauricular region on the skull to the midline.

Operation—The patient was taken to the operating room and his head was shaved and washed with tincture of green soap and water. The head and left side of the face were prepared for operation with ether and "Merthiolate," and draped to isolate the sterile area. Ether anesthesia was administered. Eight incisions were made in various sites of the left side of the head and face, the lowest immediately below the border of the mandible and the highest at the midline of the scalp. Large rubber dam drains, each 1½ inches in width were crisscrossed under the deep tissues of the face, passing in one incision and out another. In this way a complete free drainage was established. The patient was in an acute condition; therefore, unsightly scars were not taken into consideration. The foremost thought was to save his life. In a few more hours the patient would have been in such a state of severe toxemia that there would have been no chance of his survival. The operative procedure was short, yet during this time the patient stopped breathing and no pulse was obtainable. The patient was given 2 cc. of nikethamide and 2 cc. of pentamethylenetetrazol intravenously and oxygen. In a few seconds respiration was renewed. He was taken back to his bed where he received a constant flow of nasal oxygen.

Postoperative Course—For two consecutive weeks, the patient received blood or 5 per cent dextrose in saline solution intravenously. The patient remained in the hospital for 30 days, at the end of which time he was ambulatory. He was discharged with an appointment to return in one week to the dental clinic. He failed to keep this appointment, but did appear the second week. He had gained a total of 32 pounds weight during this time. The patient was seen several times throughout a year and had no complaints. In spite of the numerous incisions made on his face, only one scar on the cheek was conspicuous.

Comments—This case illustrates the disastrous consequences resulting from poor judgment on the part of the dentist in choosing the time of extraction. True, such a case seldom occurs; yet occasionally when it does happen, the grief caused the dentist and the family of the patient is never forgotten.

CHOICE OF ANESTHESIA—If the extraction of the tooth is done under general anesthesia, the postoperative pain is less and the general condition better than if local anesthesia is used. There have been reports to the effect that in certain instances where the acutely inflamed and abscessed tooth was loose, it was extracted with no anesthesia, and with no postoperative trouble. In accordance with these observations, we may suppose that the local injection has a great deal to do with some postoperative conditions. This is a problem on which more work must be done before definite conclusions can be formulated. However, there is less postoperative trouble when general anesthesia is used for the average extraction in such cases.

A theory which we have adhered to for some time is that while extractions are being done under local anesthesia, using large amounts of epinephrine as a vasoconstrictor, there is a stasis or a localization

of toxins to a small region for some length of time; whereas the same region is quickly and completely drained of its toxins, rendering no central point a virtual incubator, if general anesthesia is used. The theory has been advanced for some years by physicians specializing in internal medicine and hematology, that there is a slight toxemia after the extraction of every tooth. If the region of extraction has a free blood supply then the toxins are taken care of by the blood stream in a normal manner by nature. If a strong vasoconstrictor is used, the local region is overloaded with toxins for a long enough period of time for them to affect the surrounding tissues severely, and a great deal of soreness and swelling is experienced in many cases, to say nothing of increased infections and drainage.

■ *Prognosis*

Abscessed teeth, of course, are infected as far as the pulps are concerned; however, it is clearly seen that in some cases they are sound as to their position in the mouth. In these the devital material is removed and the tooth filled with some inert material. The prognosis as to the vitality of the tooth is always the same but, owing to differences of opinion, the tooth in some cases is removed while in others it is left to remain in good standing after treatment.

Abscessed teeth can be so severe as to cause death, or so mild as to be unnoticed because of slow development of free drainage. They may be, and often are, the forerunners of osteomyelitis causing loss of bone structure and natural contours of the face. Many times they cause loss of normal function of the local muscles. We have also seen cases in which abscesses that were not drained adequately or soon enough caused unilateral facial paralysis because of the damaging forces and bacterial action on the facial nerve.

The untreated abscess has a highly unfavorable prognosis, while the prognosis of the abscess treated well in the early stages is fair to good.

■ *Conclusion*

In no other division of medicine or dentistry are there so many diversified opinions and treatments as in surgery. There are not only many schools of thought but many individual ideas on the treatment of various conditions. It is not supposed that this particular article will pass on unscorned, and may it ever be as such, for diversified or varied ideas finally bring about advancements and achievements that are gratefully accepted (after so long a time).

Why is it that, for instance, one operator states the benefits achieved by the use of ice packs while another will use heat, or why do some choose to extract the tooth in the acute stage while others point at this technic with utter fearfulness? Perhaps the ideas of the individual may be simply taken from literature of longstanding. Yet the opinions of others may be derived from past experiences. This is good provided these experiences are numerous enough for basic evidence as to the good or ill effects produced.

To explain this matter of differences of opinion further, it might also be suspected that in some instances there is a difference in diagnostic conclusions. For example, what one man might consider the acute stage in which his operations are

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performed, another may consider the subacute stage.

In accordance with the foregoing, we might conclude that these opinions vary but maybe not so widely as pictured at first glance. Surgeons are accused numerous times of poor treatment and bad judgment, and in the majority of cases the accusation is made by members of the same field.

■ Patch Testing on Mucous Membrane

Patch testing on mucous membranes is considered when stomatitis is suspected from direct contact with an allergenic substance with the mouth, as with penicillin, tooth paste and similar possible allergens. The technics of such are described fully by Farrington (Modifications of the Goldman Technique for Contact Testing of the Buccal Mucosa, *J. Investig. Dermat.* 8:59, 1947) and Goldman and Goldman (Contact Testing of the Buccal Mucous Membranes for Stomatitis Venenata, *Arch. Dermat. & Syph.* 50:79, 1944). Briefly, this consists of fastening the allergen with collodion to a small rubber suction cup which is held in place on the surface of the teeth. A modification of this is to fasten the allergen to a rolled up rubber finger cot and to anchor the latter with silk floss around a tooth with the help of a button on the buccal surface of the teeth. The allergen is usually held in place around twenty to thirty minutes. The mucosa on the contacting surface is examined for reactions several hours to a day or two later. — *Queries and Minor Notes, J.A.M.A. 139:1124, 1949.*

VOLUME 7 • OCTOBER 1949 • NUMBER 4 CASE REPORTS

Metallic foreign bodies in oral surgery: *report of cases*

■ *Harry M. Seldin, D.D.S., New York*

Two cases are reported which point out the value of roentgenograms to the dental profession. In each case a metallic foreign body was found embedded in the soft tissue, and in each instance the patient was convinced that the metal came to be there through the negligence of the attending dentist.

CASE 1—A 47 year old white man came to the office on June 26, 1946. His lower left first molar and second bicuspid had been removed by his dentist under local anesthesia three days previously. Swelling began immediately and was associated with considerable pain. The pain and swelling became progressively worse and trismus developed.

Examination revealed a well developed man, in considerable pain, unable to open his mouth, and having difficulty in swallowing. An intraoral roentgenogram revealed the sockets of the recently extracted teeth to be clear. The mouth was opened, using a force prop, and the oral cavity was examined. The sockets seemed to be healing and had normal blood clots. There was swelling with fluctuation at the site of the inferior alveolar injection. The diagnosis was needle infection at the site of the injection.

TREATMENT—Sulfadiazine and codeine were prescribed, and the patient was instructed to use a cold magnesium sulfate compress extraorally and hot saline irrigations intraorally.

The hematologic report was: hemoglobin 93 per cent; erythrocytes 4,500,000; color index 1; leukocytes 13,500, immature neutrophils 3 per cent, mature neutrophils 71 per cent, lymphocytes 24 per cent, monocytes 1 per cent and eosinophils 1 per cent.

OPERATION—On June 28, five days after extraction of the teeth, under nitrous oxide-oxygen anesthesia, the mouth was forced open and an intraoral incision was made in the retromolar fossa. Considerable greenish black pus was evacuated. An iodoform gauze drain was inserted.

Tyrothricin iodoform gauze drains were changed every second day. Sulfadiazine was continued, since the discharge was persistent and there was a swelling in the left cheek. The patient did not return until September 6, 1946, at which time the wound was still discharging. The wound finally closed on September 20, and the patient was dismissed.

The patient returned on October 6, 1947, complaining of a sharp object in the left ramus, in the region of the anterior tonsillar pillar, about 1½ inches above and distal to the original incision in the retromolar fossa.

A lateral roentgenogram revealed a piece of metal about ⅜ inch long and 1/32 inch in thickness lodged in the ascending ramus ½ inch anterior to the lingula. An oval osteolytic region surrounded the metal (Fig. 1, left).

Examination revealed a sharp black piece of foreign body protruding from the tissue in the peritonsillar area. The object was removed with a hemostat; no anesthetic was necessary. It was found to be a piece of metal simulating a pocket knife blade, ⅜ by 1 by 1/32 inch (Fig. 1, inset). The metal was black and corroded, indicating its presence in the tissues for many years. Sulfadiazine was prescribed. Figure 1, right, is a postoperative roentgenogram of the region after removal of the object. The patient made an uneventful recovery and was discharged on October 24, 1947.

The oddity of this case is that the patient is convinced that the broken blade was left in the tissues when the incision was made June 28, 1946. Even the following facts could not influence his thinking: (1) the metal is many times larger than the no. 15 Bard-Parker blade used for the incision; (2) the previous incision was 1½ inches lower; (3) the metal is badly corroded and had been in the body for many years; (4) had a blade been broken it would have been noticed and would have been removed immediately, or when the acuteness subsided; (5) it was the opinion of Dr. Thomas Gonzales, medical examiner, that it had been in the tissues for many years.

To his recollection he was never stabbed with a knife, and the only operation he had had was a tonsillectomy many years previously. A lateral roentgenogram should have been made when the patient first presented himself, in addition to the intraoral roentgenogram of the sockets which was made, and upon which the diagnosis was determined.

COMMENTS—The metal object was in the path of the inferior alveolar injection, and the procaine hydrochloride injection seemed to make a dormant piece of metal become active

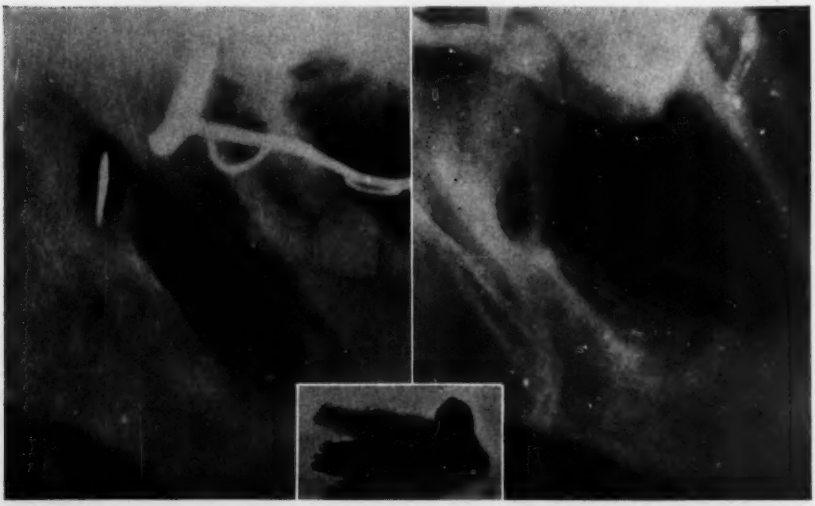

Fig. 1.—Left: Lateral roentgenogram showing metal in ascending ramus. Inset: Photograph of piece of metal, ⅜ by 1 by 1/32 inch. Right: Postoperative roentgenogram of ramus

Fig. 2.—Roentgenograms showing foreign body of metallic density under the nasal spine

and caused it to exfoliate. What was diagnosed as a needle infection proved to be an infection produced by an embedded foreign body that became active from the irritation of the procaine hydrochloride injection.

CASE 2—A white woman, aged 48, came to the office April 19, 1948, complaining of pain in the anterior part of the maxilla, and inability to wear her upper denture.

Examination revealed an edentulous upper jaw with swelling, redness and tenderness under the lip in the mucobuccal fold at the midline. Roentgenograms revealed a foreign body of metallic density under the nasal spine (Fig. 2).

Using procaine hydrochloride for bilateral infraorbital block anesthesia an incision was made over the labial portion of the maxilla, and the mucoperiosteum was retracted. A metal object simulating a piece of tubing was removed from underneath the nasal spine. There was considerable infected granulation tissue about the metal, extending to the maxilla. The infected area was thoroughly curetted. The wound healed uneventfully.

The patient has no recollection of ever receiving an injury in that region. She complained of pain in that region when the dentist took the impression for her full upper denture. She is, therefore, of the opinion that her dentist broke part of the impression tray and embedded the metal in the soft tissue. No reasoning can persuade her otherwise.

COMMENTS—Preimpression roentgenograms would have disclosed the presence of the foreign body, and the dentist would not have been blamed for the presence of the metal tubing in the soft tissue near the nasal spine.—*57 West 57th Street.*

■ ANTIBIOTICS

According to the author, chloromycetin may prove to be another miracle drug. "It is effective against gram-positive and gram-negative organisms, Rickettsiae and viruses, is nontoxic and can be given by mouth."—*P. P. Thompson, Jr., "Antibiotic Recent Trends," J. Maine M. A. 40:43, 1949.*

Adamantinoma of the mandible:

report of case

■ *Anthony Leveque, D.D.S., and S. R. Daniel, D.D.S., Port-au-Prince, Haiti*

A 26 year old Negro man was admitted to the Haitian General Hospital on December 22, 1948, with a large tumor of the mandible. Four or five years before a tumor of the anterior part of the mandible had been removed. It had been tentatively diagnosed as a multilocular cyst. Since that time there was gradual growth of a tumor of the jaw.

This tumor was of the size of a large grapefruit, and as the patient was in poor physical condition he was hospitalized.

Examination by palpation showed an extensive swelling of the body of the mandible and part of the ascending ramus on both sides, to the sigmoid notch on the left and midway to the sigmoid notch on the right (Fig. 1). There were two fistulas discharging a thick brown fluid. The tumor was nontender and there were no palpable nodes. Intraorally the mass had pushed back the lingual alveolar plate and the tongue. The mouth was kept half open. There was some movement at the joints and the patient could speak and swallow, but with difficulty.

Roentgen examination showed a multilocular mass of bone tissue with many larger cyst-like cavities at the periphery (Fig. 2, left).

As a pathologist was not available, a biopsy specimen was not studied. The tumor was diagnosed as adamantinoma of the mandible.

TREATMENT AND COURSE—On January 19, 1949, a complete resection of the mandible was performed. The blood was typed preoperatively. The patient's brother had the same type blood. As it was anticipated that local anesthesia would be rather difficult because of the anatomic structures being pushed backward by the tumor, the patient was prepared in this manner:

The night before the operation an evacuating enema was given and 1½ grains of pentobarbital sodium were administered. The next morning the patient was given another

Fig. 1.—Photographs of patient showing tumor of the mandible. Swelling extended to the sigmoid notch on the left and midway to the sigmoid notch on the right. There were two fistulas discharging a thick brown fluid. The mouth was kept half open. There was some movement at the joints and the patient could speak and swallow, but with difficulty

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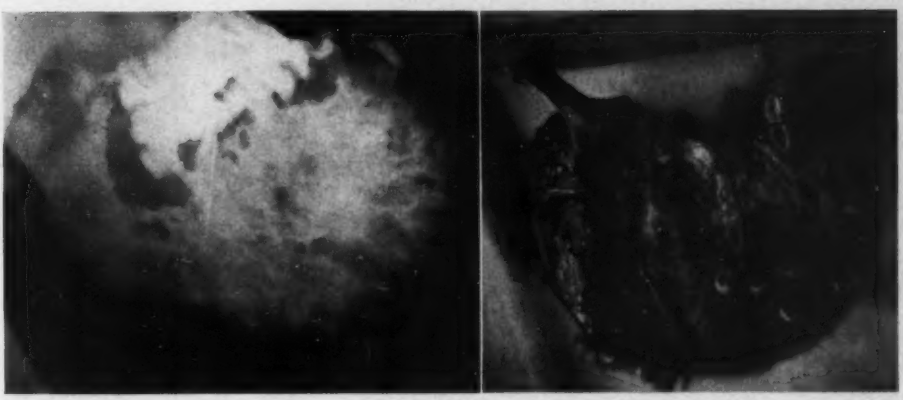

Fig. 2.—Left: Lateral roentgenogram showing multilocular mass of bone tissue with many larger cyst-like cavities at the periphery. Right: Complete resection of the mandible was performed. The tumor contained multiple cavities, some containing brown fluid, some milky fluid and some clear fluid

evacuating enema and 1½ grains of pentobarbital sodium. At 7:00 A.M. he was given an enema of milk containing 4 grams of chloral.

The patient was taken to the operating room and, under local anesthesia, an incision was made from the right preauricular region to the left. As this incision was made with an ordinary knife there was considerable bleeding and a great deal of time was lost ligating oozing vessels; we had not thought of ligating the external carotid arteries primarily. We had planned to give a whole blood transfusion to the patient during the operation, but because the patient's brother refused, no blood was available and we were obliged to give approximately 1,500 cc. saline solution and dextrose intravenously.

The tumor was dissected carefully and the temporomandibular joints were disarticulated (Fig. 2, right). The subcutaneous tissues were closed with catgut, the tongue was sutured to the muscles of the floor of the mouth; the intraoral wound and skin were closed with interrupted sutures after inserting three rubber dam drains. A head cap was adjusted and anterior traction was applied on the tongue which was attached to a wire extending from the head cap.

The tongue was covered with gauze which was kept moist with saline solution. The next day the blood pressure had fallen to seriously low levels so the patient was given 500 cc. of whole blood and 1,000 cc. of 10 per cent dextrose in water. He received 30,000 units of penicillin every three hours. He was fed through a stomach tube.

On January 22, the dressing was changed and the drains were removed; on January 25, traction was released on the tongue and the amount of penicillin was reduced to 20,000 units every three hours. The use of the stomach tube was discontinued because the patient could swallow. On February 5, all sutures were removed and he was able to walk about the ward unassisted. After three weeks the patient was able to eat bananas and other soft food and recovery was uneventful.

COMMENTS—The pathologic process involved the entire mandible except the coronoid and condyloid processes on both sides. The tumor contained multiple cavities, some of which were perforated during the excision. Some of them contained brown fluid, some milky fluid and some clear fluid.—*Haitian General Hospital.*

Pressure atrophy of the mandible:
report of case

■ *S. A. Brandon, D.D.S., Portland, Ore.*

While a 34 year old white woman was having a routine dental roentgenographic examination, a rarefied region at the angle of the mandible was observed (Fig. 1, left). There was no pain and only slight swelling lingually. The patient was unaware of the condition.

EXAMINATION—The clinical examination was negative and nothing could be felt by palpation. Because of its proximity to the inferior dental canal and the unknown cause of the lesion it was decided to do an exploratory operation.

The patient was hospitalized on May 4, 1946. A physical examination revealed a normal, healthy young lady with no apparent defects. Her blood pressure, pulse and respiration were normal. The blood examination showed: serology negative; hemoglobin 13.25 Gm., red blood cells 4,560,000, white blood cells 11,250, polymorphonuclear leukocytes 62 per cent, mononuclear leukocytes 7 per cent, staphylococcus cells 2 per cent. Urinalysis: specific gravity 1.01; color yellow; reaction alkaline.

The preoperative diagnosis was cyst, idiopathic. The patient was given 1½ grains of pentobarbital sodium the night before the operation. On May 6 she was given a light breakfast but no lunch. At 12 noon she was given 1½ grains of pentobarbital sodium, and at 12:45 she was given $\frac{1}{150}$ grain of atropine sulfate.

OPERATION—At 1 p.m. the patient was prepared for the operation. The left side of the face and neck were washed with tincture of green soap and water followed by alcohol ether and tincture of merthiolate. Thiopental sodium

Associate professor of Oral Surgery, University of Oregon Dental School.

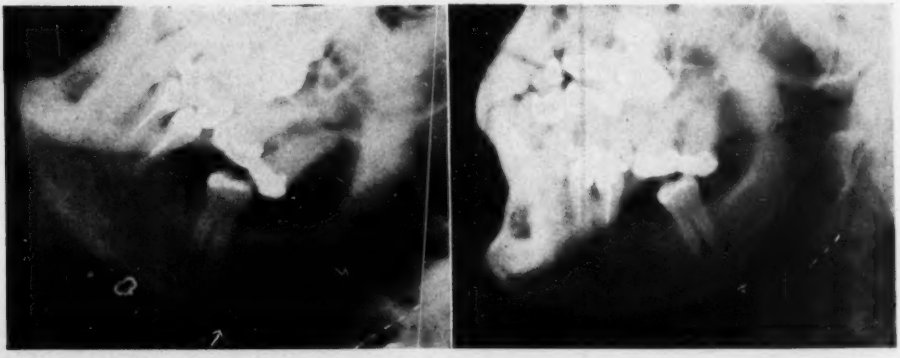

Fig. 1.—Left: Lateral view of left side of the mandible showing rarefied region at the angle. Right: Roentgenogram of left mandible taken a year after operation. Note smaller rarefied region and regeneration of bone in lower margin of inferior border of mandible

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endotracheal anesthesia, closed system, with nitrous oxide-oxygen was administered. An incision 1½ inches long was made 1 cm. below the inferior border of the mandible from behind the angle forward, following the wrinkle lines of the neck. After ligating the facial artery and vein, the masseter muscle and periosteum were stripped from the bone. A bulging membrane appeared at the site of the rarefied region. It was dissected out bluntly, and was found to be protruding from the submaxillary gland. However, it appeared cystic in texture rather than glandular. It was peeled away from the bone and submaxillary gland and was sent to a pathologist for examination.

After removing all remnants of the cystic capsule which was filled with a straw-colored fluid, the sharp edges of the bone were smoothed with a bone file. Sulfanilamide crystals were sprinkled in the wound, and two layers of continuous 00 catgut were used for the tissue sutures and no. 1 interrupted silk for the skin. Sulfanilamide crystals were sprinkled on the wound, several thicknesses of gauze were placed over the wound and bandaged with a two inch roller bandage, firmly taped.

POSTOPERATIVE COURSE—Ice packs were applied to the side of the patient's face immediately, and thirty minutes alternately for six hours thereafter. She was given 100 mg. of meperidine hydrochloride as needed for pain. She was allowed a regular diet. Her temperature rose to 100 F. on May 7, but returned to normal on May 8. There was some swelling but no pain. The dressings were changed daily. The patient was discharged on May 10, and the skin sutures were removed two days later in the office.

The patient was seen periodically until the wound was completely healed. A roentgenogram (Fig. 1, right) taken in June 1947, a year after the operation, showed regeneration of bone in the lower border of the mandible.

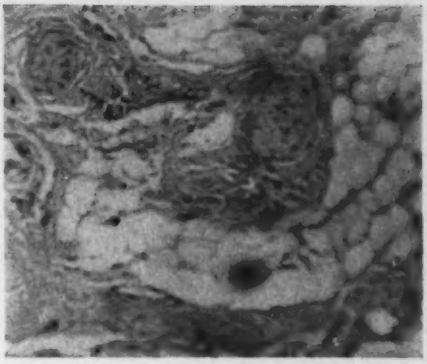

Fig. 2.—Photomicrograph of tissue showing small irregular fragments

PATHOLOGIC REPORT—The section consisted of a number of small, irregular fragmented pieces of tissue, some of which were tan and others hemorrhagic (Fig. 2). The largest one measured 1 cm. in diameter. Apparently it was a cyst wall which was soft and smooth throughout. The diagnosis was cystic membrane with chronic inflammatory change.

CONCLUSION—Thorough oral roentgenograms should be made of all patients. If the cyst described here had not been noticed, it could have progressed to a dangerous stage. When the diagnosis of a condition is uncertain, an exploratory operation should be performed. The operator's suspicions and responsibilities are relieved and the patient's fears are allayed.

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Cooperation between the dental and medical professions in the fight against cancer

THE VITAL IMPORTANCE of early diagnosis and treatment of cancer are the keystones of the educational programs now being directed to the medical and dental professions as well as to the laity. A well organized campaign to this end has been carried on both through the organized medical and dental professions and through voluntary health agencies such as the American Cancer Society. Considerable progress has been made through these projects by stimulating the general interest in the cancer problem and by obtaining public support in the fight against this disease. Most of these activities, essentially educational in character, include lectures before lay organizations, the establishment of a scientific periodical devoted exclusively to cancer, the preparation of articles for the public press, the display of scientific exhibits and motion pictures at medical and dental conventions and the publication and wide distribution of brochures on cancer to the professions and laity.

In this campaign the phrase "cooperation between the medical and dental professions" frequently is used in a somewhat restricted sense with the implication that such cooperation is exemplified by a dentist and physician routinely meeting and conferring in individual cases of suspected oral cancer; it is also inferred that the problem of earlier diagnosis and treatment would be solved largely by more individual cooperation of this nature. The policy of consultation among those who practice the healing arts is an old and accepted custom in difficult cases of all kinds and requires no particular emphasis so far as cancer is concerned.

When a patient first consults a dentist or a physician, the prompt recognition of the possibility of cancer or of any other serious illness depends to a great extent on the outcome of this individual patient-doctor contact. If the possibility of a serious disease is realized at the first visit, the major difficulty has been overcome and the problem is well on its way to being solved. If the individual dentist or physician who first

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sees a patient with mouth cancer has a sound basic knowledge of this disease and suspects the diagnosis, he will either refer the patient elsewhere for an expert opinion or will take a specimen for biopsy himself. The restricted use of the term, "cooperation," implying that it takes at least two people to suspect the diagnosis of cancer, is ill advised at this stage of the problem.

The problem of failure to diagnose oral cancer will not be solved by preaching that the dentist must in all cases call in a physician for "cooperation" in order to advise the patient for further necessary steps. If the dentist (or physician) is to act efficiently and intelligently, however, he must necessarily be familiar with the general aspects of oral cancer and select for further investigation those patients whose clinical symptoms are sufficiently suggestive. Histories of patients with this disease show in a high percentage of cases that the advice of a family dentist had been sought before a physician was consulted (gingiva, 59 per cent of cases; tongue, 30 per cent of cases). Even though oral cancer patients frequently consult a dentist first, this disease is a medical rather than a dental problem and the proper treatment can be given only by those who are medically trained.

The fact that patients with oral cancer so frequently consult a dentist first places a great responsibility on the dental profession. The medical profession should have been aware of this fact long ago and should have realized its responsibility by offering to provide specific instruction on oral cancer in dental schools. Investigation will show, however, that dentists have had little opportunity to become familiar with the subject of malignant tumors of the mouth. There are several reasons for this. In the past the subject of cancer has been given little attention in dental textbooks, dental schools and dental society meetings.

The responsibility for this neglect in undergraduate and postgraduate instruction rests in part upon the medical profession. The present day difficulty of obtaining early diagnosis and prompt treatment in patients with oral cancer can at least partly be solved by the joint efforts of the organized medical and dental professions, provided they cooperate in organizing and *making available instruction in the clinical and diagnostic aspects of oral cancer in dental schools and at dental society meetings.* The dental profession should cooperate first by requesting and then by accepting such assistance and integrating such educational programs in their organized activities. Certainly it would be better to place the emphasis on "cooperation between the medical and dental professions" in the oral cancer problem on a broad educational level rather than on the basis of the individual patient with this disease.—*Hayes Martin.*

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James A. Blue

BOTH THE American Dental Association and the Alabama Dental Association suffered an irreparable loss in the death on June 8, 1949, of James A. Blue of Mobile, formerly of Birmingham. Dr. Blue had served both his state and national organizations in practically every capacity. He served the Alabama Dental Association as secretary-treasurer and as president and also served on the Board of Dental Examiners as secretary and as president. He served several times as chairman of the section on Oral Surgery and Radiography of the American Dental Association; he served one term as vice-president of the American Dental Association and acted as delegate many years. Dr. Blue was a charter member and a past president of the American Society of Oral Surgeons and was a charter member of the newly formed Southeastern Society of Oral Surgeons. Dr. Blue was one of the first specialists in his field in the country, having limited his practice to this work for some thirty-five years.

Dr. Blue was the recipient of the first certificate issued by the American Board of Oral Surgery. This was in recognition of his outstanding work on the Committee of

the American Society of Oral Surgeons which fostered and organized the American Board of Oral Surgery. He was a Fellow of the American College of Dentists and was a past national Grand Master of the Psi Omega fraternity.

Dr. Blue had been in poor health for some time, but his death was unexpected as he had worked the day before his death.

Very few men in the American Dental Association had a record of attending more national meetings than Dr. Blue and there was none who had more friends in every section of the country. His place will be difficult to fill.

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VOLUME 7 • OCTOBER 1949 • NUMBER 4 SURGICAL ORAL PATHOLOGY

The registry of dental and oral pathology

■ *Henry A. Swanson, D.D.S., Washington, D.C.*

World War I emphasized the need for a central laboratory of pathology to serve the United States Army, and the succeeding years saw the establishment of such a laboratory as part of the Army Medical Museum. The Department of Pathology soon developed to the point where it became the major function of the Museum. In view of this enlarged activity and the frequent misunderstanding of its function because of the name, "Army Medical Museum," the Surgeon General, in 1943, approved a new designation, "The Army Institute of Pathology."

The American Registry of Pathology, operating under the auspices of the National Research Council, is housed at the Army Institute of Pathology by authority of the Surgeon General of the United States Army. The purpose of the Registry is to collect pathologic material, to record and catalog it, and to conduct comprehensive investigations by methods of follow-up studies and original research. At present there are 17 registries, each representing a specific field of pathology. They are sponsored by national scientific and professional societies, bringing about close cooperation between these organizations and the Institute.

Howard T. Karsner, Chairman of the Committee on Pathology, National Research Council, has stated with reference to the activities of the Registries: "Collection for the sake of mere possession is as futile in medicine as in any other field. In cultural spheres, the art museum serves as a source of education to the public, of stimulus to the artists, and of research in history both special and general, and the library has much the same purpose. In science, however, although the objectives are the same, the emphasis often differs in that research occupies the foremost position, even though education and stimulation are prominent aims.

"A registry is usually established because of the direct interest of a comparatively small group of inspired guiding spirits. The location of the registry may be determined by the institutional situation of an individual or a small group. However, to be most effective the registry must be at least national in scope, and often, if it is placed in a local institution, various factors may operate so that the collection may not be adequate. As a consequence of these elements, the Army Institute of Pathology, situated in the capital city of this country, has been especially favored. This Institute is unique in the world. Nowhere else has there been a concentration of pathologic specimens that is comparable. Nowhere else have civilian pathologists and other interested members of the 'health profession' taken such a great part in organization and operation. Nowhere else has there been, and continues to be, such a close liaison between medical personnel and civilian doctor."

Abstract of a paper read before the third annual meeting of the American Academy of Oral Pathology, February 5, 1949.
Chairman of the Council on Dental Museum and Registry of the American Dental Association.

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REGISTRY OF DENTAL AND ORAL PATHOLOGY—The establishment of the Registry of Dental and Oral Pathology in 1933 was predicated on the basis of the value that would accrue to dentistry in the diagnosis, teaching and research in the field of dental and oral pathology. Colonel James B. Mann had the vision, and through the efforts of John T. Hanks the American Dental Association gave its hearty approval and support to the project. A Dental Museum Committee was appointed and has continued to be most active, each year showing definite progress in carrying out the early concept.

The early progress was slow, and it required considerable effort on the part of the personnel at the Institute and the various members of the American Dental Association Committee to convince the civilian dental and oral practitioners that the Registry program was primarily for their benefit. In the first report of the Committee to the House of Delegates of the American Dental Association, covering the years 1934 and 1935, it was reported that only nine dental schools had answered a letter concerning the establishment of the Registry program and the institution of an exchange service between the Army Medical Museum and the dental schools. All the replies were favorable, but apparently the other schools either were not interested or did not have a department of oral pathology. The first report also stated that approximately 375 cases had been accessioned and placed in the Registry files.

During 1936 and 1937 the dental officers attached to the Museum had multiple duties which necessitated their absence from the Museum more than half the time. It was felt that if the Dental Section was to be equal to the other sections at the Museum, a full time specially trained dental officer was necessary. Our efforts to obtain one were successful and the then Captain Joseph L. Bernier was assigned for duty on July 11, 1938. From this time on the activities of the Dental Registry program showed real progress, owing to his untiring effort and enthusiasm.

In the report of 1938, 178 new cases raised the total in the Registry to 661. Ten loan sets of 60 slides each were completed and made available.

In 1940 the Museum Committee suffered the loss, by death, of George Winter and Rudolf Kronfeld, two very staunch supporters. In the report for that year it was stated that 810 cases from general sources and 495 cases from the Central Bureau for the Study of Tumors, Philadelphia, had been received and accessioned, making a total in the Registry of 2,113 cases. The civilian members of the profession were beginning to support the program as evidenced by the increased accessions for the year. The first edition of the Atlas, numbering 50 copies, was published and almost completely exhausted within the year. Loan study sets were being utilized by dental schools for teaching purposes.

It was reported that the biopsy and consultation services were becoming increasingly important in the Registry activity. The increase in the use of these services by members of the profession placed this Registry in an enviable position as one of the most popular of all the registries maintained at the Museum. The inquiries being received and the requests for consultation service indicated the gradual acceptance by the practitioner of the importance of pathology in the practice of dentistry. The dependence on the Registry for aid in the diagnosis of oral lesions enabled the participants better to outline treatment. It was felt that this represented a healthy trend toward a more scientific approach to the many problems of the profession.

WAR EMERGENCY—In 1942 the activities at the Museum were influenced by the war emergency and by the augmented dental personnel in the armed services and the consequent increase in the demand for biopsy and consultation services. The civilian dentists who suddenly became dental officers quickly were made aware of the medical department's many facets, and the Registry facilities became an integral part of their diagnostic services. Captain Bernier, in addition to his duties at the Institute, taught at the Army Dental School and thus came into personal contact with the newly inducted dental officers. He took the oppor-

tunity of indoctrinating them into utilization of the biopsy and consultation services. The value of the Registry program was gradually being publicized so that there was an ever increasing number who began to recognize dental and oral pathology as a specialized field and as a needed field of practice.

CONSULTANTS COMMITTEE—The functioning of the Consultants Committee was proving to be a very satisfactory adjunct to the Registry. The first year of operation they reviewed some 50 cases. Six hundred and thirty cases were accessioned to make a total of 3,261 in the files.

In 1944 two consultants were added to the Committee of six. These men were becoming the nucleus of a group thinking along similar lines, and through their cooperative effort were actively lending support to the advancement of the special field of oral and dental pathology. The interchange of pathologic material which began at this time benefited their schools and the Registry. I regret to say that in spite of efforts to secure cooperation of all educators and clinical men, there were a few who felt that the Registry was usurping their activities and taking their cases without giving them full credit. The policy of the Registry has always been one of full cooperation with ample protection of all cases submitted. It was reported in 1944 that approximately 4,000 cases were in the Registry files.

KODACHROME SLIDES—A file of kodachrome slides was inaugurated in 1944. These slides were made available on loan. The subjects of dental caries, periodontal diseases, stomatitis, tumors and jaw lesions were partially covered. Additions have been made from time to time and there are now more than 2,000 slides in the file.

FURTHER PROGRESS—In 1946 there were approximately 6,000 cases in the Registry files. The third edition of the Atlas was published and the Fellowship in Dental and Oral Pathology, sponsored by the American Dental Association, was inaugurated. The purpose of the Fellowship is to teach and train an individual in dental and oral pathology so that he can qualify as a teacher or research worker in a dental school. The urgent need for such teachers was recognized and the training available at the Institute for a person who has the basic education would help to alleviate that situation. The Fellowship program is a real achievement and it justifies all the effort which has made it possible. The first Fellow remained only four months as he was called into the military service. The second Fellow has been in training six months. He is an excellent student, and should prove the value of this program. The opportunity for training at the Institute is not limited to oral and dental pathology but covers general pathology as well. The specialists in specific fields of pathology attached to the Institute, the consultants who devote time to special projects, the various conferences and seminars make the training course a veritable super-postgraduate course in pathology.

In 1947 it was reported that there were 6,956 cases registered, an increase of 956 cases for the year. The fourth edition of the Atlas was in preparation, the format being entirely changed and the text greatly expanded. Special study sets were prepared for the dental schools at Georgetown University, the University of Washington, the Naval Dental School and the Dental School of Copenhagen, Denmark. All of these sets included material on diseases of the soft and hard dental structures as well as on tumors of the oral regions.

In 1948 it was reported that there were approximately 8,000 cases registered, an increase of more than 1,000 in one year. The demand for the appearance of Lt. Colonel Bernier at meetings was becoming heavy, but he accepted without hesitation, for he believed that by so doing he was educating the profession in the value of oral and dental pathology. The fourth edition of the Atlas was printed and made available. Selected material from the registry files has been made available to Tufts College Dental School, the University of Louisville and the University of Tennessee.

The Army Institute of Pathology, under the able leadership of Colonel James E. Ash, retired, and Brigadier General Raymond O.

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Dart, has made much of this program possible. It is due to their recognition of this field as an important part of the health services that has made every facility at the Institute available. Their praise of the Dental Registry activity has been voiced in their discussions before many groups, so that dentistry is recognized as a unit equal to any other component of the Institute.

The Council on Dental Museum and Registry is prepared to aid the profession through the facilities of the Registry of Dental and Oral Pathology in any desired pathologic research or study and can provide consultation service on problems of diagnosis.

Under General Order No. 32, Department of the Army, dated July 6, 1949, the name of the Army Institute of Pathology has been changed to the Armed Services Institute of Pathology.

Cystadenoma of the mandible

■ *joseph L. Bernier,* D.D.S., M.S., and Harold W. Krogh,† D.D.S., Washington, D.C.*

The mucoepidermoid tumors of the salivary glands recently described by Stewart, Foote and Becker[1] include many of those lesions of the salivary glands which have heretofore been classified as cystadenoma, adenocarcinoma and cylindroma. The epidermoid tendencies of the epithelial structures which are mucus-producing are prominent characteristics of these tumors. Cystadenomas of the salivary glands, while not common, have been reported. It is our opinion that many of these lesions fall within the group of mucoepidermoid tumors. The squamous features encountered in the cystadenoma, together with the active production of mucin in the acinar cells, lend some weight to this belief. While it is not always possible, nor in many instances practical, to attempt an association of a specific tumor with a basic tissue in determining its histogenesis, in certain instances this does seem warranted. Certain authors are of the opinion that the mucoepidermoid tumors represent an example of such an association, inasmuch as they seem to stem from the lining cells of the striated or excretory ducts of the salivary glands. Stewart, Foote and Becker, following their extensive analysis of mixed tumors, were able to satisfy themselves that this association did exist. All of their tumors were positive with mucicarmine stains. In an examination of the Army Institute of Pathology's collection of mixed tumors we were equally impressed with this association, particularly from an oncologic point of view.

* Executive Secretary of the Registry of Dental and Oral Pathology, Army Medical Museum, Washington, D. C.

† From the Department of Surgery, School of Medicine, George Washington University, Washington, D. C.

1. Stewart, F. W.; Foote, F. W., and Becker, W. F., Muco-Epidermoid Tumors of the Salivary Glands. *Ann. Surg.* 122:820 (Nov.) 1945.

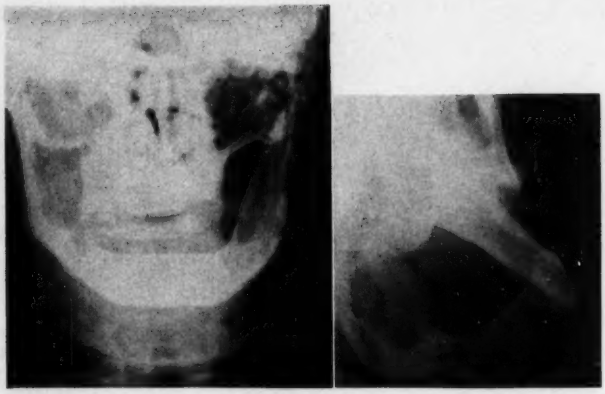


Fig. 1.—Roentgenograms revealed bone destruction extending from the angle to the coronoid process and involving the base of the neck of the condyle

A case of so-called cystadenoma of the mandible is reported, which might well be considered a variety of the mucoepidermoid tumors of salivary gland origin.

HISTORY—The patient was a 60 year old white man. In 1937 a radicular cyst, approximately 1 inch in diameter, was removed from the lower portion of the ramus on the right side of the mandible. The patient could not recall any previous trauma to the region. Since 1937 he had had episodes of intermittent pain. At the time of examination (March 17, 1945) the patient complained of pain in the right side of the mandible in the region of the ramus. His mouth was completely edentulous. Roentgenograms revealed bone destruction extending from the angle to the coronoid process and involving the base of the neck of the condyle (Fig. 1, left). The appearance was that of a cyst or possibly a giant cell tumor. Only a very thin shell of the cortex of the bone was preserved on the mesial anterior aspect. There was some paresthesia on the right side of the face.

OPERATION—On March 19, under procaine hydrochloride anesthesia an incision was made along the anterior border of the ramus from the third molar region to just below the coronoid process, exposing the lesion. The bone defect was filled with a soft spongy friable material which was removed piecemeal. The cavity was packed with ½ inch gauze impregnated with bismuth paste, and the soft tissues were sutured. Beginning ten days after operation about an inch of gauze packing was removed at biweekly intervals. The last of the packing came out six weeks after the operation.

FOLLOW-UP—The patient was re-examined on September 18, 1945. The paresthesia was no longer present and the bony defect was filling satisfactorily (Fig. 2, *A* and *B*).

In March 1946, a year after the operation, another examination showed the bony defect had filled in with new bone. There was no evidence of active disease. A few flecks of bismuth remained (Fig. 2, *C* and *D*).

MICROSCOPIC OBSERVATION—The biopsy specimen (Fig. 3) consisted of a small section of what appeared to be mucosa covered with hyperplastic stratified squamous epithelium exhibiting some spongiosis. It was not possible to determine whether this represented oral mucosa or a dysontogenetic emplacement. Attached to this mass were several irregular fragments of tumor tissue composed of irregular collections of glandular epithelium which, in some areas, had maintained their acinar configuration and

in others had assumed squamoid features. Numerous large cystic spaces were lined for the most part with a flattened cuboid epithelium and were filled with a mucinous material. In many areas the lining epithelium had overgrown, producing papillary projections which extended into the lumens of these spaces. No anaplasia was noted, nor were mitotic figures in evidence. Goblet cells filled with mucus were present in some of the epithelial masses.

COMMENTS—There can be no reasonable doubt concerning the origin of this lesion. Its association with glandular epithelium is obvious. Inasmuch as no connection between the tumor mass and the oral mucosa was apparent,

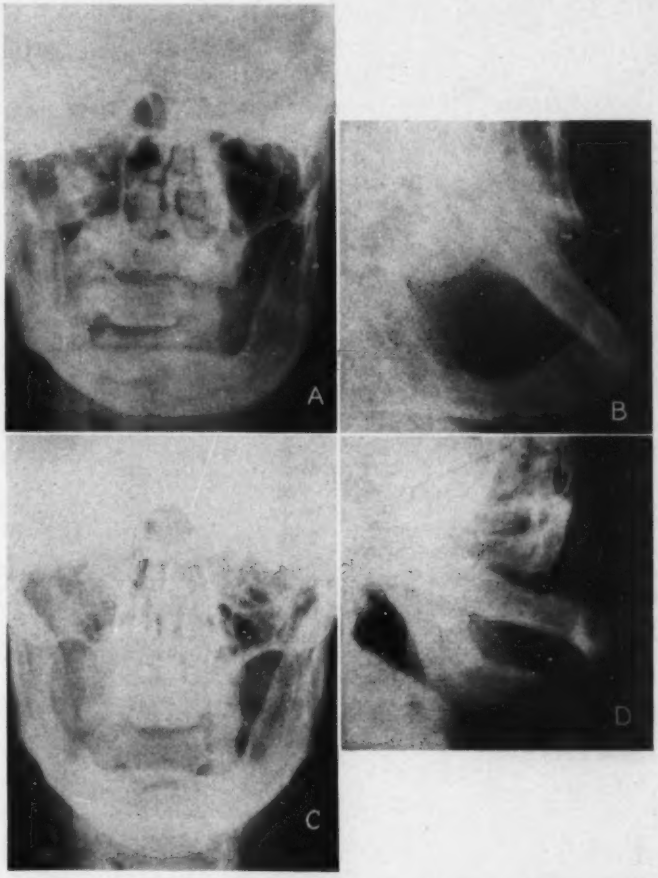


Fig. 2.—A and B: Roentgenograms taken six months after surgical intervention showed the bony defect filling in. C and D: Roentgenograms taken a year after the operation showed the defect had filled in with new bone. There was no evidence of active disease

Fig. 3.—Proliferating squamous epithelium is seen in the lower portion of the photomicrograph; a large cystic space is lined by flattened cuboid epithelium. Note the mucus-like material in the center of this space

clinically, the possibility of aberrant salivary gland elements must be considered. We are of the opinion, however, that such a background is difficult to prove, particularly in view of the absence of all teeth. It might be assumed that after extraction oral mucosa became incorporated in the wound during suturing. Thus, it is possible that portions of the modified salivary glands in the oral mucosa might have remained behind and have provided the stimulus for the production of this tumor. Although the appearance of misplaced tissue with the formation of hamartomas is not unusual, it is difficult to prove the origin of tumors under conditions such as obtained in this case.

Aside from the problem of etiology, we are impressed with the similarity of this lesion to mucoepidermoid lesions arising from salivary gland tissue. It is our impression, as stated previously, that this lesion should be placed in that category. It is apparent that this group of lesions can and should be separated from the generic group of mixed tumors of salivary gland origin. Most investigators have tended to group all tumors of the salivary glands as mixed tumors, using special designations only when the histologic pattern seems variable enough to warrant special consideration.

The question of malignant potentialities in the tumor reported here has been carefully considered. Our observations lead us to believe that this lesion is essentially benign as evidenced by the cellular characteristics of the epithelium and the excessive production of mucus. The latter point is important in that it indicates that the tumor cells have retained, or by process of reversion have attained, one of the important normal functions of glandular epithelium.

CONCLUSION—A case of so-called cystadenoma of the mandible of eight years' duration is reported. Although the lesion is histologically similar to cystadenomas of the salivary glands, it is our opinion that it should be classified as a variety of the mucoepidermoid tumor of salivary gland origin.

Heteroplastic bone formation in the cheek

■ *Joseph L. Bernier, D.D.S., M.S., and Harold W. Krogh, D.D.S., Washington, D.C.*

In myositis ossificans, bone is produced in muscle tissue, usually as a result of a traumatic or an inflammatory stimulation. This is in a sense a self-limiting process although occasionally it may tend to be progressive. Certain forms of myositis ossificans must be considered as idiopathic. However, it is important to state that the process of bone formation represents a process of metaplasia and must be considered as a type of heteroplastic activity. These situations represent specific entities, however, and the occurrence of solitary areas of bone in normal connective tissue is a process which cannot be considered specific, but rather a spontaneous assumption on the part of the fibroblasts of the ability to produce bone.

The formation of a solitary area of ectopic bone in the connective tissue of the cheek was seen recently and is reported in this discussion.

HISTORY—The patient was a Negro woman, aged 59, who was deaf and blind, so it was impossible to obtain an accurate history. A member of her family said the lump in her cheek had been present for some years. She was seen in the Episcopal Eye, Ear and Throat Hospital dental clinic for routine dental examination on November 17, 1947. Many teeth were missing in both jaws; of those that remained some were carious; oral hygiene was poor. The mucous membranes were pale and a slight marginal gingivitis was present. In the left cheek at the occlusal level and about a half inch from the corner of the mouth there was a hard, freely movable mass about the size of a hickory nut (illustration, *A*). This mass was so hard that a bony tumor was suspected and a roentgenogram was taken which confirmed the presence of bone (illustration, *B*).

OPERATION—Under procaine hydrochloride anesthesia a horizontal incision was made and the mass was easily shelled out by blunt dissection. There was very little bleeding and the incision was closed with five deep cotton sutures.

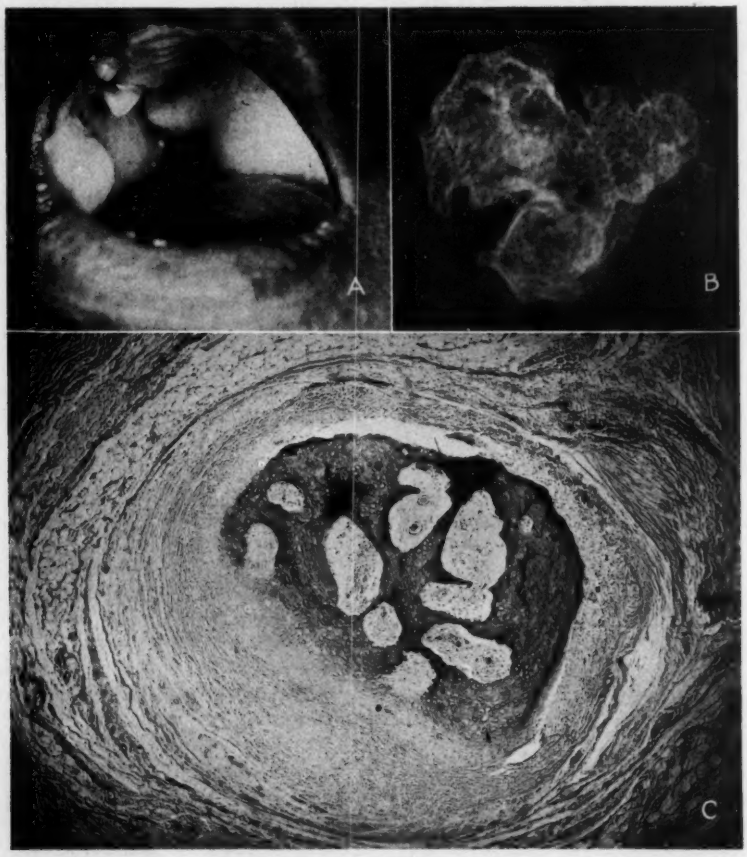
HISTOLOGY—The lesion removed consisted for the most part of a fibrofatty tissue matrix with a slight degree of vascularity. Most of the blood vessels were distributed about the periphery of the mass, and were of the capillary type. There was a small number of small lymphocytes with only an occasional mononuclear cell in evidence. In certain areas the fibroblastic activity of the mass was pronounced as evidenced by the plump, active appearance of the individual cells, all of which appeared to be producing considerable interstitial material. Toward one end of the mass there was an enlarged, somewhat irregular zone of fatty tissue which was beginning to show interstitial fibrous tissue formation, suggesting the possibility of a sclerosing lipoma.

In the tumor itself two separate masses of bone were observed. The larger was surrounded by a halo of active fibrous connective tissue which showed increased collagenization about the periphery. The inner surface of this capsule-like mass blended with a zone of osteoid tissue in which plump and active osteoblasts could be seen, then into essentially normal bone. This observation represents the usual picture seen in membranous bone formation although the final structure was not essentially normal in every respect.

There was evidence of repeated osteogenesis and osteoclasis within the more adult calcified bone and the embedded osteocytes varied considerably in size. A series of marrow spaces was noted which were moderately vascularized and contained a loose edematous type of fibrous connective tissue. This entire focus

of bone formation was surrounded by a fairly well defined zone of adult fibrous connective tissue together with some fatty tissue. The smaller mass of heteroplastic bone resembled in all respects that of the larger area just described except for the lack of individual marrow spaces. There was a crescent shaped area of active osteogenesis surrounded by fibrous marrow substance showing considerable vascularity (illustration, *C*). This entire mass of tissue was devoid of a well defined capsule, a situation which was discernible in the roentgenogram and at time of operation.

DISCUSSION—In considering those factors which may be significant in calling forth neo-



A: The tumor mass may be seen bulging from the inner surface of the cheek. B: Roentgenogram of the tumor before removal. Evidence of calcification is noted. C: Photomicrograph showing one of the foci of bone formation. Note the capsular arrangement of the fibrous connective tissue which blends with a zone of osteoid tissue

plastic properties in normal fibroblasts, one must think first of the proximity of normal bone to the heteroplastic substance being produced. In this instance that does not appear to have been a factor, since no bone was present in the immediate vicinity.

In addition, the presence of calcific deposits in necrotic tissue must be given some consideration. The presence of an active inflammatory reaction with organization of the necrotic tissue followed by terminal ossification is another influencing factor. From an idiopathic point of view, it is likely that certain tissues may have a predisposition to calcification and subsequent ossification, associated with disturbances of calcium and phosphorus metabolism. In the case being reported there is some evidence that a tumor mass previously existed, perhaps of a lipoid variety that underwent subsequent degeneration with production of cell necrosis. Sclerosing lipomas in skin and mucous membrane have been reported previously.—*Registry of Dental and Oral Pathology.*

■ Anticoagulants

When the Quick test is employed as a means of regulating dicumarol dosage, each new lot of thromboplastin used in conducting the test should be assayed in terms of T^{100}, T^{30}, T^{20} and T^{10} (T^{100} = av. prothrombin time in sec. of undiluted plasma. T^{30}, T^{20}, T^{10} = av. prothrombin time in sec. of 30, 20 and 10 per cent plasma, respectively, in 0.9 per cent sodium chloride solution), utilizing plasma obtained from three normal subjects. Dicumarol should not be given on days when the prothrombin time is longer than T^{20}. When prothrombin time exceeds T^{10} on two successive days, menadione bisulfite should be administered to forestall bleeding.—*E. A. Hines, Jr., and others, "Anticoagulant Therapy in Chronic Cardiovascular Diseases," M. Clin. North America* 33:335, 1949.

■ Procedure for Removal of Giant Cell Tumor

Q.—Should a radical procedure ever be used to remove a central giant cell tumor?

A.—Not unless there is pathologic evidence that the tumor is malignant. Except in very rare cases central giant cell tumors can be satisfactorily removed by thorough curettage followed by cauterization of the bony cavity.

■ Large or Multiple Pulp Stones

Q.—Are large or multiple pulp stones indications for extraction of a tooth?

A.—Not unless there is definite evidence that they are a contributing or causative factor to the patient's difficulty.

■ Extraction Site as Portal of Entry for Polio Virus

Q.—What is the possibility of the poliomyelitis virus using as a portal of entry a socket from an extracted tooth?

In newspaper lists of precautions against poliomyelitis is the suggestion that teeth should not be extracted during the months poliomyelitis is prevalent. Is there any scientific background for these statements?—*M. Ullman, D.D.S.*

A.—Research work on the mouth as a portal of entry for poliomyelitis virus was first done by Aisenberg and Grubb, who published their observations in 1945 (Exposed Pulps of Teeth as Portals of Entry for Poliomyelitis Virus, J.A.D.A., May, 1945). Two other workers, Reese and Frisch, reported work on the high incidence of carious pulp exposures in patients with poliomyelitis (Carious Teeth as Portal of Entry for Poliomyelitis, Indus. Med., March, 1947). Aycock, in the American Journal of Medicine in 1941, demonstrated a high incidence of bulbar and other more severe types of polio following tonsillectomy (Constitutional Types and Susceptibility to Paralysis in Poliomyelitis, Am. J. M. Sc., September, 1941). Finn, Korns and Bahlke reported on the possibility of exposed dental pulp as a portal of entry for poliomyelitis. (Exposed Dental Pulp as Portal of Entry for Virus of Poliomyelitis, Am. J. Hyg., September, 1947). The general opinion of these writers is that there is a possibility of any operative area in the mouth or throat being a portal of entry for poliomyelitis virus and that elective operations, including extractions, should be discouraged during the active polio season.—*Dr. Thomas Francis, Epidemiologist, School of Medicine, University of Michigan.*

■ Diamond Point Surgical Bur

Q.—Can a diamond point surgical bur compare with a metal surgical bur on such points as efficiency, sterilization, clogging, postoperative pain and infection?—*B. Tucker.*

A.—Diamond instruments cut with most effiency on a hard surface such as dental enamel. Softer tissues do not divide under a rapidly revolving diamond stone but instead are lacerated. The degree of hardness of bone does not permit clean surgical division of this tissue with diamond cutting instruments and the resultant trauma would probably increase postoperative pain. Diamond stones can be used effectively in oral surgery in the sectioning of teeth to facilitate their removal. A diamond bone file is manufactured and can be used with moderate efficiency. There appears to be no real advantage of this instrument over the standard steel bone file. All diamond instruments can be adequately cleaned and sterilized.

UMI

■ Doctors of Infamy. Alexander Mitscherlich and Fred Mielke. 165 pages, 16 pages of photographs. Price $3. New York: Henry Schuman, Inc., 1949.

"Freedom, frivolously surrendered, comes home to roost in the shape of tyranny. Whoever squanders his liberty earns only contempt. He finds that out soon enough under the heel of a tyranny that holds him in the same contempt it teaches him for others."

By presenting a collection of documents, the authors illustrate the tragedies of professional men who permitted themselves to be swept by political ideology into organized murder in Germany.

Statements by Dr. Andrew C. Ivy, vice-president, University of Illinois, who was nominated by the American Medical Association, by Brigadier General Telford Taylor, Chief of Counsel for War Crimes, U.S. Army, and by Dr. Leo Alexander, Psychiatrist, Consultant to the Secretary of War, attest to the fact that atrocities were committed by German physicians.

Citizens of democratic countries will find appalling moment in the words of Dr. Ivy, "The inhuman treatment of Jews served as a propaganda device for the promotion of anti-Christian immoral and unscientific ideology of the inner quality of human beings, or the mythology of the Master Race. During the war it became evident that this mythology was extended to include the Poles, Russians, and Slovenes in such a manner as to constitute genocide (the annihilation of an ethnic group)."

Evidence is presented that the so-called experiments with low pressure, low temperatures and euthanasia, that the intravenous injections of phenol and gasoline and that the attempts of mass sterilization were in reality murders committed under the defense of political expedients and superior orders.

A chapter by Albert Deutsch includes the Geneva version of the Hippocratic oath, the last paragraph of which is designed to prevent recurrences of such politico-mass killings. "I will maintain the honor and the noble traditions of the medical profession. My colleagues will be as my brothers. I will not permit consideration of race, religion, nationality, party politics or social standing to intervene between my duty and my patient. I will maintain the utmost respect for human life from the time of its conception. Even under threat I will not use my knowledge contrary to the laws of humanity."

Yes, a depressing book; but one to be read widely if we are to be forewarned against unconditional obedience to the chilly ways of bureaucracy.—*J. M. Wisan.*

■ Photographic Aids to Clinical Dental Practice. James M. Dyce. 175 pages, 199 illustrations. Price $10.10. London and New York: Staples Press, Inc., 1948.

This book is compiled to illustrate the author's conviction that photography is invaluable in dental surgery as a medium of assessing clinical observations and of disseminating knowledge of dentistry.

The principles which have been born from the author's personal experience over a dozen years of practice of intraoral photography are presented. They have emerged from tackling the problems confronting the application of photography to routine dental practice. This is a study of the subject of dental photography rather than a comprehensive textbook. Six chapters under the heading, "Visual Education," illustrate various aspects of the use of photographs for teaching, research and education. Four chapters under the heading, "Clinical Photography," deal with the photographic problems associated with the oral cavity. The introduction of the book by the author points out the great value of photography as an adjunct to the practice of dentistry from sev-

eral points of view. He states that it is a great personal asset to establish a photographic reference library as a pool of personal experience from which to draw from time to time. The value of photographs in the field of dental research and private practice, in teaching dental students, as training films for army personnel, dental hygienists and education of the public are invaluable. He points out the value of special teaching films in the treatment of maxillofacial injuries and points out the peacetime application of photography in dental practice by means of making records from which entirely new facts are derived for the advancement of the dental profession. The book is profusely illustrated with beautiful colored photographs illustrating all phases of both normal and abnormal oral conditions.

Chapter 1 deals with the gingival story of inflammation and graphically presents the clinical signs of the various types of inflammatory reactions involving the gingival tissues.

Chapter 2 deals with the value of color photography for intraoral records of preoperative and postoperative treatment conditions.

Chapter 3 is an unusually interesting chapter showing the study of the effects of high velocity missiles on the dental structures by means of photography.

Chapter 4 deals with clinical observations of color values and the development of a color consciousness in diagnosis and treatment of oral lesions.

Chapter 5 deals with various types of training films in the teaching of army and civilian personnel in the field of hygiene and mouth care.

Chapter 6 discusses the value of a photographic library under various dental conditions. This includes the collection, cataloging and filing of photographic material.

Part II of the book, which is made up of four chapters, is somewhat technical and discusses the various types of equipment including cameras, light, retractors and technics for photography of the various parts of the mouth. This also includes the use of motion pictures and includes both black and white and color photography.

This book is nicely arranged from the standpoint of adequate illustrations in relationship to the text. This excellent presentation of numerous large photographs in relationship to the text makes for ease of understanding and interest in reading. The book is well presented with excellent paper and large type and would be an asset to every dentist's library. It is of extreme value to the person interested in visual education in the practice of dentistry.

■ THE NEOCORTEX OF MACACA MULATTA. Gerhardt von Bonin and Percival Bailey. 163 pages. Price $4. Urbana, Ill.: University of Illinois Press, 1947.

Neuroanatomists, neurologists and mathematicians have in the last years succeeded in lifting a corner of the veil that hides the mechanism of cortical function, the basis of human thinking. It is not now the localization of distinct functions to distinct areas of the cerebral cortex—motor area, somesthetic, visual, auditory areas, and so forth—but the interaction of the different cortical fields, their dominance or interdependence, that are the most interesting and most promising research problems. Experimental work in this field, for instance on monkeys, is essential for the solution of these problems, though results can not simply be applied for the human brain. One of the most important conditions however, for the correct interpretation of the animal experiment is the minute knowledge of the structure of the cerebral cortex, that is of the number, distribution and type of nerve cells in the six traditional layers of the cortex.

The cytoarchitecture of the human brain had been and is still being investigated. Bonin and Bailey, both eminently prepared for such a work, have now reexamined the cell structure of a macaque monkey, macaca mulatta. They have succeeded in establishing a map of the brain cortex in this animal, which will be the indispensable basis for all future experimental research. Their report contains information on cerebral growth, pattern of fissures and finally a description of the architectural types of the cortex. Sixty-two plates from microphotographs of selected sections, 40 diagrammatic drawings

and finally a colored table summarizing the results as a map of the macaque brain give clarity and documentary evidence to the descriptions in the text.—*Harry Sicher, M.D.*

■ Trigeminusneuralgie und Praxis. Paul Heyden. 43 pages, 6 illsturations. Konstanz, Germany: Zahnarztliche Welt, 1949.

The booklet presents a general review of the various types of trigeminal neuralgias. It contains neither case reports nor original contributions. Its merit lies, perhaps, in a clear delineation of the peripheral or symptomatic neuralgias from the genuine or idopathic forms. Diagnostically the difference is not always easy to recognize. The dentist's skill is concerned with helping to establish the differential diagnosis and with the highly effective therapy in cases of "false" or symptomatic trigeminal neuralgias. In order to illustrate the difficulties involved I cite the case of a faculty member of a leading dental school in whom the existence of a primary idiopathic trigeminal neuralgia appeared almost certain. Only the reluctance of the neurologist to proceed sent the case back for re-examination by dentist-colleagues, whereupon a hidden apical abscess was found.

A carefully established history is of primary importance. Painful attacks after eating usually point towards a pulpitis. Hypersensibility to pressure at atypical facial points and inability to sleep almost always indicate a dental origin. The etiology of symptomatic trigeminal neuralgia is many fold. Causes may reside in: pulpitis, formation of secondary dentin, pulpstones (denticles) hypercementosis, chronic periapical ostitis; neoplasms in the form of odontoma, adamantinoma, follicular cysts; unerupted teeth and retained roots, postanesthetic damage; osteomyelitis, necrosis, infected wounds, bony spurs, foreign bodies and fractures.

The therapy in symptomatic neuralgias caused by such conditions is the task of the dentist. Postoperative roentgenograms are necessary.

The symptoms in genuine, idiopathic trigeminal neuralgias may be identical to those of symptomatic or peripheral neuralgias. The differential diagnosis requires the services of medical specialists, particularly of neurologists. Major causative factors of genuine trigeminal neuralgias generally are considered to be: syphilis, tabes, multiple sclerosis, progressive paralysis; malaria, lead-mercury-arsenic poisoning, arteriosclerosis, vascular spasms at the trigeminal roots, intracranial tumors.

In symptomatic neuralgias the irritation and often the damage of trigeminal nerve branches is primarily due to infection and pressure effects. In idiopathic neuralgias histologic or clinical changes of the trigeminal nerve and of its ganglion have never been established. Sometimes there is evidence of neuritis and of changes in the vascularization of the nerve and ganglion (vasomotor spasms). The true nature of the disease, however, is not understood.

Therapy of idiopathic trigeminal neuralgia must be the task of the neurologist. It consists essentially of alcohol injections into the nerve or its ganglion, tearing the nerve roots, resection and electrocoagulation. Elimination of the cervical sympathetic trunk by procaine hydrochloride injections into the stellate ganglion recently has gained favor also. Vasoconstricting nerve fibers are presumably eliminated which results in an improved vascularization of the trigeminal nerve itself.

A third portion of the review deals with benign and malignant tumors of the oral cavity and of the brain. The former admittedly are of little importance as causative factors in neuralgias. Six reproductions of roentgenograms of such tumors (odontoma, cystic adamantinoma, follicular cyst, sarcoma and carcinoma of the mandible) are given as an appendix.—*A. Zimmermann.*

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■ HEMANGIOMA: AN EVALUATION OF TREATMENT BY INJECTION AND SURGERY. Neal Owens and Kathryn L. Stephenson. Plast. & Reconstruct. Surg. 3:109, March, 1948.

In this article Owens and Stephenson evaluate the results of treatment of 95 cases of hemangioma by injection of sodium murrhuate and by surgical incision.

The authors give a historical background of certain methods of treatment of hemangioma. It was stated that the methods have not been of recent discovery but the indications have been more clearly defined and the results improved.

Statistics from a series of 1,056 cases compiled by Watson and McCarthy were cited. In this series 73 per cent of the patients presented evidence of hemangioma at birth and 85 per cent developed the lesions before the age of 1. The female is affected two to three times as often as the male. Fifty-two per cent of all hemangiomas occur on the head.

The authors describe the hemangiomas as tumors of independently growing blood channels with their origin in the rudiments of mesodermal tissue. The lesions may be neoplastic or congenital anomalies. Occasionally, the adventitial elements may become neoplastic.

Clinical diagnosis generally is not difficult. There is usually discoloration, change of contour, blanching on pressure and possibly, a bruit.

Forms of irradiation therapy or treatment by carbon dioxide snow were found to be undesirable or ineffectual.

In almost all types of hemangioma it was felt that injection therapy was indicated with surgical excision to be selected when there was not satisfactory response to injection, where there was malignant degeneration or where cirsoid aneurysm was present. The injection therapy was recommended where excision would approximate vital structures, produce a poor cosmetic result or where the lesion was extensive. A disadvantage cited was the repeated visits required for such treatment.

The injection technic is simple. The amounts of individual injections varied from 1 minim to 4 cc. of sodium morrhuate spaced at intervals of 10 days to 5 weeks. Thirty-nine patients were treated by this method, the youngest being 6 weeks of age and the oldest 35 years.

The authors excised 56 hemangiomas from individuals whose ages varied from 6 weeks to 50 years. In 38 of these closure was possible by direct approximation with satisfactory results.

Ten representative cases were presented briefly with pictures illustrating certain points for consideration in evaluating the therapy advocated and the effects produced.—*L. E. McKelvey.*

ON THE TREATMENT OF UNREDUCED BILATERAL FORWARD DISLOCATION OF TEMPOROMANDIBULAR JOINT. J. C. Basil Jones. Brit. D. J. 86:275, June 3, 1949.

This article reports the case of a 16 year old boy who presented with an abnormal and imperfect bite. There was rather extreme malnutrition. Upon questioning it was found that his difficulty dated back to the time when he had his tonsils removed at the age of 6½, nine years previous to the time of the examination. After the tonsillectomy his mother noticed that he changed from a "round faced little boy" to one with a long face, but he had suffered no inconvenience following the tonsillectomy. Roentgen examination showed bilateral forward dislocation of both temporomandibular joints and both condyles were very small in size.

It was decided to correct this prognathic deformity, which is very clearly shown by excellent photographs in this article, by means of Kostecka's operation. This was done by

means of a blind operation cutting through the ascending ramus with a Gigli saw. After cutting of the bone the jaw was pushed backward sufficiently to lock the teeth in good occlusion by means of prearranged splints. The postoperative recovery was uneventful. The splints were left in place for six weeks and then removed. The functional result was reported as very good. The patient gained weight and his general situation improved following correction. The author suggests that it is possible that a number of congenital prognathism cases may in fact be traumatic owing to injury at birth.—*H. T. E. Sly.*

In Queries and Comments in the April issue of the JOURNAL OF ORAL SURGERY *a question was asked by Dr. Howard Lawrence of Columbus, Ohio, concerning the treatment of a bilateral chronic dislocation of the temporomandibular joints of nine years' standing. At that time our comment was that to our knowledge no such case had previously been reported. After reading this comment Mr. H. T. E. Sly was kind enough to send the foregoing abstract of an article published in the British Dental Journal under date of June 3, 1949.*

■ INTERNAL WIRE-PIN IMMOBILIZATION OF JAW FRACTURES. James Barrett Brown, Minot P. Fryer and Frank McDowell. Plast. & Reconstruct. Surg. 4:30, January, 1949.

Various methods of treating complicated and compound jaw fractures occur in the literature which would lead one to believe there is no uncomplicated solution to the problem. The authors outline a method of internal wire fixation for fractured jaw immobilization. They still recognize the fact that interdental wiring is the method of choice when enough teeth are present, in proper position for adequate immobilization.

When, for some reason, interdental wiring or other fixation would not be sufficient, the fractured lower jaw can be immobilized by a Kirschner wire, .05 to .08 inch, driven across the fracture site. This method has been used frequently in cases where there is: lack of available teeth; symphysis fracture; fracture at the angle with the posterior fragment displaced into the upper fornix; a compounding into the mouth with infection and sloughing.

This method, as described by the authors, is used in conjunction with the dental arch bar and circumferential wires. When reduction is to be accomplished in stages, or gradually with rubber band traction, the internal pin is not put in until this is accomplished.

The technic of introducing the internal wires is outlined. A power drill is used to drive the wires across the fracture site, while the fragments are held in reduction by another person. If usable teeth are present, this holding can be facilitated by reduction of the fracture, and then immobilizing it, by interdental wiring, or even if not too securely, by the application of an interior dental arch of twisted steel wire. The internal wire is sharpened to a three-sided point and placed firmly on the bone through a nick in the skin and denuded periosteum. It is driven across the fracture below the nerve canal, through the cortex on the other side and left in the bone if it feels solid enough. A pressure dressing is applied to prevent hematomas and swelling of the soft tissues.

Complications following the use of the internal wire have been slight, confined for the most part to slight drainage around the pins.—*W. C. Moorman.*

■ TUMORS OF SALIVARY GLAND ORIGIN. Grantley W. Taylor, M.D., and Gerald G. Garcelon, M.D. New England J. Med. 238: 766, May 27, 1948.

This article summarizes the experiences of these two men at the Massachusetts General Hospital from 1930 to 1941, and at Pondville State Cancer Hospital from 1927 to 1941, inclusive.

The usual case was that of an asymptomatic tumor of the submaxillary and parotid region. These were discovered either by accident or because of a painless swelling.

The differential diagnosis of carcinoma and mixed tumors were listed:

	Mixed Tumor	*Carcinoma*
Average age	30-40 yrs.	50-60 yrs.
Average duration	More than 3 yrs.	Less than 1 yr.
Consistency hard	30%	80%
Enlargement of cervical nodes	3%	47%
Primary facial palsy	0%	25%
Remote metastases	0%	25%

Clinical examination reveals at the time of operation the lack of definition of the limits of the tumor, persistence of fixation as operation proceeds, apparent implication of the branches of the seventh nerve, all of which argue for the probable diagnosis of cancer.

Simple enucleation has no place in the treatment of these lesions. A radical excision of the gland with visualization and protection of the facial nerve (Adson-Ott operation) is the preferred procedure.

Treatment of carcinoma is unsatisfactory by the use of either surgical intervention or roentgen therapy. A 12.5 percent rate of cure was all that could be effected in 40 patients having surgical treatment.—*C. Litton.*

Announcements

■ National Blood Program

The American Red Cross recently announced that 97,000 pints of blood had been donated voluntarily during the first year in response to the activities of the National Blood Program. This is one of the important activities of the American Red Cross.

■ Ninth Edition of The National Formulary in Preparation

The revision and publication of *The National Formulary* is one of the important services rendered by the American Pharmaceutical Association. According to present plans the ninth edition will include tolerances of weight variation of dry filled ampuls and standards of disintegration time of tablets. The main emphasis will be upon revised and improved specifications for strength, quality, purity and identity of drugs included in *The National Formulary*. The addition of 140 new items has been approved by the committee.

■ Courses in Minor Oral Surgery

Two weeks courses in minor oral surgery will be offered at the University of Michigan on these dates: October 24—November 4; February 13—February 24; March 27—April 7; May 8—May 19.

For information address W. K. Kellogg Foundation Institute of Graduate and Postgraduate Dentistry, University of Michigan, Ann Arbor, Mich.

■ Oral Roentgenology Established in the University of Pennsylvania

A course in Oral Roentgenology is being established under the Graduate School of Medicine through the facilities of the Evans Institute, University of Pennsylvania. Dr. LeRoy M. Ennis is the director of the course.

The course is to be given annually, beginning with the first week of October until the end of May with a tuition fee of $800. Participation in this course will lead to a candidacy for the degree of Master of Dental Science.

For further information address W. S. Parker, M.D., Graduate School of Medicine, University of Pennsylvania, Philadelphia 4, Pa.

■ American Cancer Society

Mouth Cancer and the Dentist, a brochure by Hayes Martin, discusses in detail the lesions indicating cancer or precancerous conditions, the necessary steps to be taken by the dentist in the diagnosis of the suspicious lesions and the indications and precautions to be observed, dentally, before and after treatment has been instituted for the cancer. This discussion is amplified and pointed up by a profuse number of illustrations.

Mouth Cancer and the Dentist will be published in October 1949 by the American Cancer Society and will be available to all dentists in the United States.

■ West Virginia Society of Oral Surgeons

A group of oral surgeons, practicing in the state of West Virginia and devoted to the improvement of oral surgery in the state, met on May 20, 1949, and formed a temporary Society of Oral Surgeons. A constitution committee was appointed so that at the next meeting in Huntington, W. Va., 1950, this organization could take permanent form. Edward C. Armbrecht was appointed temporary chairman and L. A. Stark temporary secretary-treasurer. The following men participated in the meeting: C. R. Adams, Charleston; Edward C. Armbrecht, Wheeling; Morris E. Brown, Fairmont; Frank N. Carroll, Wheeling; Charles D. Messerly, Wheeling; L. A. Stark, Clarksburg. The temporary officers were instructed to present a constitution and bylaws for adoption at the 1950 meeting.

■ Graduate Work in Oral Surgery

The Division of Graduate and Postgraduate Studies at Tufts College Dental School can accept a limited number of candidates for graduate work in oral surgery. For information address correspondence to Arthur H. Wuehrmann, D.M.D., Division of Graduate and Postgraduate Studies, Tufts College Dental School, 416 Huntington Avenue, Boston, Mass.

■ The American Academy of Pedodontics

The American Academy of Pedodontics will meet in San Francisco October 14 and 15, 1949. For further information write Elsie C. Schildwachter, D.D.S., 6831 Seville Avenue, Huntington Park, Calif.

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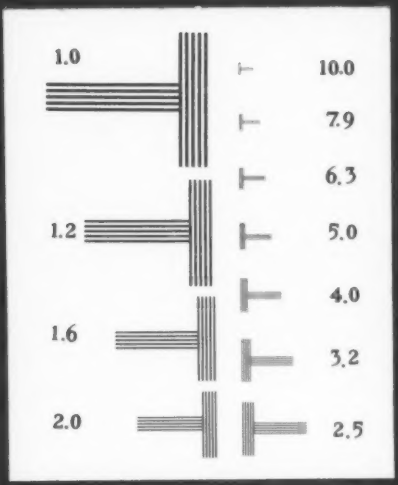

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In microfilming, it is necessary to determine the reduction ratio and multiply the number of lines in the chart by this value to find the number of lines recorded by the film. As an aid in determining the reduction ratio, the line above is 100 millimeters in length. Measuring this line in the film image and dividing the length into 100 gives the reduction ratio. Example: the line is 20 mm. long in the film image, and $100/20 = 5$.

Examine "T-shaped" line groupings in the film with microscope, and note the number adjacent to finest lines recorded sharply and distinctly. Multiply this number by the reduction factor to obtain resolving power in lines per millimeter. Example: 7.9 group of lines is clearly recorded while lines in the 10.0 group are not distinctly separated. Reduction ratio is 5, and $7.9 \times 5 = 39.5$ lines per millimeter recorded satisfactorily. $10.0 \times 5 = 50$ lines per millimeter which are not recorded satisfactorily. Under the particular conditions, maximum resolution is between 39.5 and 50 lines per millimeter.

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